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The Altitudinal Distribution of the Ferns of the Appalachian Mountain System.

By John K. Small.

The following paper is a small portion of the results obtained in collecting and tabulating the altitudes observed and recorded for the plants of the East American Flora. The work was finished last winter, but was then, and is still, withheld from publication in order that more observations may be secured. It is too incomplete as yet to furnish any exact conclusions, and this part is here presented for the purpose of calling attention to this still almost entirely unknown department of Eastern North American Botany.

Careful and systematic altitudinal observations of plant stations have for a long time been recorded in England, and in the last few years the work has been prosecuted to some extent by Dr. C. Hart Merriam and his assistants in the pursuit of his biological survey for a portion of Arizona, especially in the vicinity of San Francisco Mountain. But in the eastern part of our continent, where the floral features are perhaps better known than anywhere else in North America, there is practically nothing on record concerning it. It is hoped that this preliminary contribution will excite an interest in the subject among our botanists and lead them to observe and record, as nearly correct as possible, the altitudes of the plants with which they may meet, especially in the Appalachian Mountain system and the contiguous territory.

A tentative attempt has been made to correlate the distribution of the following ferns with the faunal distribution as worked out by Dr. J. Allen (*Geographical Distribution of North American Mammals, Bull. Amer. Mus. Nat. Hist. iv. 199-244 (1892)*), and I have used the terms applied by him there to faunæ for floræ. In the main, the distribution of ferns appears to agree with that of mammals, but there seem to be some discrepancies which further observations may tend to reduce.

Dr. Allen has divided and subdivided the faunal areas of North America into *Realms*, *Regions*, *Subregions*, *Provinces*, *Subprovinces*, *Districts* and *Faunæ*. The latter only need concern us at present, and of his eleven faunæ four cover the territory under consideration. These are known as the CANADIAN, the ALLEGHANIAN, the CAROLINIAN, and the LOUISIANIAN, and their geographic limits in the following lines are taken from Dr. Allen's paper already mentioned; however, their western portions are not considered here.

1. The CANADIAN FLORA includes the northern half of New England, Northern Ontario, New Brunswick, Quebec, and the southwestern angle of Newfoundland. In addition to this more or less connected area, it is represented by detached tracts of greater or less extent along the summits of the Appalachian Mountain System as far south as Georgia.

2. The ALLEGHANIAN FLORA is bounded on the north by the *Canadian*, and on the south by the *Carolinian*. It runs southward as an irregular belt on the upper slopes of the mountains, separating the *Canadian* from the *Carolinian*.

3. The CAROLINIAN FLORA meets the *Alleghanian* on the north in Pennsylvania, New York and New Jersey, and doubles the mountain system where the latter runs out in Northern Alabama and Georgia. It passes into the plains on the west and on the east descends into the pene-plains, reaching the Atlantic Ocean from Virginia to New York, and separated from the water from Virginia southward by the *Louisianian*.

4. The LOUISIANIAN FLORA includes all the Southern States south of the *Carolinian* except the extreme end of South Florida.

Now, what I hope to be able to work out in the future is: 1.—how far the *Canadian flora* descends down the slopes from the summits of our highest mountain peaks; 2.—at what altitude the

Canadian meets the *Alleghanian flora* along the upper slopes, and how far the latter extends down the mountain sides; 3.—the altitude to which the *Carolinian* rises to meet the *Alleghanian;* 4.—the line where the Louisianian and the Carolinian come together. This can be done only by the collection and tabulation of an immense number of altitudinal observations on all the plants of Eastern North America, and I take occasion through this channel to ask my fellow botanists to note and record careful observations when in the field, and report to me at their convenience.

Of course, the areas, belts or lines, as the case may be, will be affected by local conditions, and are influenced in the same way by the latitude as well as the altitude, the latter being a more or less perfect exhibition of the former in a perpendicular manner. On account of the influence of latitude the lines which bound the different areas will, if we start at the north and go south, gradually converge towards the mountains and rise towards the summits as the latitude decreases. If the direction be from south to north the lines will descend from the highlands and diverge at angles or curves from the mountains, expanding into broad areas towards the north. The problem is, as already stated, to locate these lines.

With the assistance of data at hand and the geographic distribution, the ferns as given below have been placed each in its respective flora or floras, and by the aid of altitudes the direction of the lines can be seen in a general way.

POLYPODIUM POLYPODIOIDES (L.) A. S. Hitchcock. (*Polypodium incanum*, Swartz.). Ranges from sea-level, from Virginia Beach, Va. (Britton) to Florida and the Gulf coast to 4,000 feet on Blowing Rock Mt., N. C. (Small & Heller); occurs at 1,000 feet in Winston county, Ala. (Mohr); at 3,000 feet at Estatoah Falls, Ga. (Small); at 2,100 feet at Marion, Va. (Miss Vail). [*Southern Carolinian; Louisianian.*]

POLYPODIUM VULGARE L. Ranges from sea-level along the Atlantic coast, from Central New Jersey northward to 5,800 feet on Grandfather Mt., N. C. (Small & Heller); occurs at 1,000 feet in Winston county, Ala. (Mohr); at 3,000 feet in Rabun county, Ga. (Small); at 5,678 feet on White Top Mt., Va. (Small); at 2,700 feet in Garrett county, Md. (J. D. Smith); at

2,300 feet on the Pocono Mt., Pa. (Porter); at 2,100 feet near Onteora, N. Y. (Miss Vail); at 4,000 feet in Northern Vermont (Pringle). [*Carolinian; Alleghanian; Canadian.*]

CHEILANTHES ALABAMENSIS (Buckl.) Kunze. Occurs at 450 feet in Bibb county, Ala. (E. A. Smith); at 600 feet near Florence, Ala. (Mohr); at 1,000 feet in Lawrence county, Ala. (Mohr). [*Carolinian.*]

CHEILANTHES TOMENTOSA Link. Occurs at 600 feet near Florence, Ala. (Mohr); at 1,900 feet in Swain county, N. C. (Beardslee & Kofoid); at 1,000 feet at Toccoa Falls, Ga. (Small); at 1,500 feet on the highest ridge in Talladega county, Ala. (Mohr). [*Carolinian.*]

CHEILANTHES LANOSA (Michx.) Watt. (*Cheilanthes vestita*, Swartz.) Ranges from near sea level along the Atlantic coast from New York southward to 1,900 feet in Swain county, N. C. (Beardslee & Kofoid); occurs at 750 feet in Gwinnett county, Ga. (Small); 800 feet at in Cullman county, Ala. (Mohr); at 1,000 feet at Roanoke, Va. (Britton); at 1,500 feet at Harper's Ferry, Md. (J. D. Smith); at 250 feet in Lancaster county, Pa. (Porter). [*Alleghanian; Carolinian.?*]

PELLÆA ATROPURPUREA (L.) Link. Ranges from 150 feet at Tuckahoë, N. Y. (Mrs. Britton) to 2,200 feet in Smyth county, Va. (Small); occurs at 1,000 feet in Ala. (Mohr); at 2,000 feet on Mt. Willoughby and Mt. Horr, Vt. (Faxon). [*Alleghanian.*]

PELLÆA GRACILIS (Michx.) Hooker. Ranges from 2,000 feet in Sullivan county, Pa. (C. E. Smith) to 2,500 feet on Mt. Willoughby, Vt. (Faxon), descends to 100 feet in Northern Vermont (Pringle). [*Alleghanian.*]

PTERIS AQUILINA L. Ranges from sea level along the Atlantic coast to 5,000 feet on Grandfather Mt., N. C. (Small and Heller); occurs at 3,000 feet in Rabun county, Ga. (Small); at 3,500 feet on the Iron Mts., Va. (Mrs. Britton); at 2,700 feet in Garrett county, Md. (J. D. Smith); at 2,300 feet on the Pocono Plateau, Pa. (Porter); at 1,200 feet at Westmore, Vt. (Deane); at 1,200 feet at Jaffrey, N. H. (Deane). [*Canadian, Alleghanian, Carolinian, Louisianian.*]

ADINATUM CAPILLUS-VENERIS L. Ranges from sea level in Florida to 250 feet in Central Alabama (Mohr); occurs at 700 feet

at South Pittsburg, Tenn. (Middleton); at 1,3000 feet at Cumberland Falls, Ky. (J. D. Smith). [*Louisianian; Carolinian.*]

ADIANTUM PEDATUM L. Ranges from sea level, along the Atlantic coast from New Jersey northward, to 5,000 feet on White Top Mt., Va. (Small); occurs at 1,000 feet in Northern Alabama (Mohr); at 1,200 feet near Toccoa Falls, Ga. (Small); at 4,000 feet on Blowing Rock Mt., N. C. (Small and Heller); at 2,700 feet in Garrett county, Md. (J. D. Smith); at 2,000 feet near Onteora, N. Y. (Miss Vail); at 1,000 feet at Franconia, N. H. (Faxon); at 2,500 feet in Willoughby Mt., Vt. (Faxon). [*Carolinian; Alleghanian.*]

WOODWARDIA AREOLATA (L.) Moore. Ranges from sea level along the Atlantic coast to 3,000 feet in the Great Smoky Mts., N. C. (Beardslee & Kofoid); occurs at 800 feet near Cullman, Ala. (Mohr). [*Louisianian; Carolinian; Alleghanian.*]

WOODWARDIA VIRGINICA (L.) Smith. Ranges from sea level along the Atlantic and Gulf coasts to 1,300 feet in Huntingdon county, Pa. (Lowrie); occurs at 200 feet near Colchester, Vt. (Pringle); at 300 feet at Belchertown, Vt. (Jesup). [*Louisianian; Carolinian; Alleghanian.*]

ASPLENIUM ACROSTICHOIDES Swartz. Ranges from near sea level along the Atlantic coast, from New Jersey northward to 5,000 feet on White Top Mt., Va. (Mrs. Britton); occurs at 2,700 feet in Garrett county, Md. (J. D. Smith); at 2,000 feet at Onteora, N. Y. (Miss Vail); at 1,000 feet at Amherst, Vt. (Brainerd); at 1,500 feet at Willoughby, Vt. (Rusby). [*Alleghanian.*]

ASPLENIUM ANGUSTIFOLIUM Michx. At 200 feet in Vermont (Pringle); ascends to 1,000 feet at Danville, Vt. (Faxon); occurs at 3,700 feet on Blue Mt., N. Y. (Miss Knight); at 1,200 feet in Blair county, Pa. (Porter); at 1,000 feet in Winston county, Ala. (Mohr). [*Alleghanian.*]

ASPLENIUM BRADLEYI D. C. Eaton. At 1,600 feet on Lookout Mt., Ala. (Mohr); descends to 1,000 feet at Stone Mt., Ga. (Small); to 260 feet in Lancaster county, Pa. (Small). [*Alleghanian.*]

ASPLENIUM EBENOIDES R. R. Scott. Ranges from sea level at Philadelphia, Pa. (Scott), to 1,400 feet at Mt. Crawford, Va. (Heller); occurs at 400 feet in Hale county, Ala. (Miss Tutwiler); at 300 feet near Easton, Pa. (Porter, Small); at 500 feet in Sussex county, N. J. (Rusby); at 700 feet near Canaan, Conn. (Adam). [*Alleghanian.*]

ASPLENIUM FONTANUM (L.) Bernh. Occurs at about 600 feet above Williamsport, Pa. (McMinn).

ASPLENIUM FILIX-FŒMINA (L.) Bernh. Ranges from sea level along the Atlantic coast to 6,000 feet on Grandfather Mt., N. C. (Small & Heller); occurs at 800 feet in Cullman county, Ala. (E. A. Smith); at 5,000 feet on White Top Mt., Va. (Mrs. Britton); at 2,700 feet in Garrett county, Md. (J. D. Smith); at 2,000 feet at Onteora, N. Y. (Miss Vail); at 2,000 in Northern Vermont (Brainerd, Rusby). [*Louisianian; Carolinian; Alleghanian; Canadian.*]

ASPLENIUM MONTANUM Willd. Ranges from Northern Pennsylvania to Georgia along the mountains, descends from 4,500 feet on Grandfather Mt., N. C. (Small & Heller) to 260 feet in Lancaster county, Pa. (Porter); at 1,600 feet on Lookout Mt., Ala. (Mohr); at 1,500 feet in Georgia (Small); at 2,700 feet in Garrett county, Md. (J. D. Smith); at 1,500 feet on Mt. Tammany, N. J. (Knipe). [*Alleghanian.*]

ASPLENIUM PARVULUM Mart. & Gal. Ranges from near the Atlantic coast, from Florida to Virginia, to 2,400 feet in Smyth county, Va. (Small); occurs at 1,000 feet in Lawrence county, Ala. (Mohr); at 1,700 feet near Johnson City, Tenn. (Porter). [*Louisianian; Carolinian.*]

ASPLENIUM PINNATIFIDUM Nutt. Ranges from sea level at Philadelphia, Pa. (Nuttall) to 4,300 feet on Grandfather Mt., N. C. (Small & Heller); occurs at 600? feet in Blount county, Ala. (J. D. Smith); at 1,500 feet at Stuart, Va. (Heller); at 1,500 feet at Harper's Ferry, Md. (J. D. Smith); at 300 feet in Eastern Pennsylvania (Porter). [*Alleghanian.*]

ASPLENIUM PLATYNEURON (L.) Oakes. Ranges from sea level along the Atlantic coast to 4,200 feet on Blowing Rock Mt., N. C. (Small & Heller); occurs at 2,000 feet in Rabun county,

Ga. (Small); at 2,700 feet in Garrett county, Md., (J. D. Smith); at 2,000 feet in Monroe county, Pa. (Porter); at 500 feet in Vermont (Brainerd, Pringle). [*Alleghanian; Carolinian.*]

ASPLENIUM RUTA-MURARIA, L. Ranges from Vermont to New Jersey at about 300 feet; occurs at 1,600 feet on Lookout Mt., Ala. (Mohr); at 1,500 feet at Warm Springs, N. C. (J. D. Smith); at 2,100 feet at Marion, Va. (Judge Brown); at 250 feet in Northampton county, Pa. (Porter); at 2,200 feet on Mt. Willoughby, Vt. (Faxon). [*Alleghanian.*]

ASPLENIUM TRICHOMANES, L. Ranges from near sea level from New Jersey northward to 2,500 feet on Mt. Mansfield and Mt. Horr, Vt. (Faxon); occurs at 2,000 feet on the Pocono Mt., Pa. (Porter); at 2,100 feet in Smyth county, Va. (Small); at 1,000 feet near Gadden, Ala. (Mohr). [*Alleghanian.*]

ASPLENIUM VIRIDE, Hudson. At 4,000 feet on Mt. Mansfield, Vt. (Pringle) descends to 2,000 feet in Smuggler's Notch, Vt. (Faxon). [*Canadian; Alleghanian?.*]

SCOLOPENDRIUM SCOLOPENDRIUM (L.) Karst. (*Scolopendrium vulgare*, Smith.) Ranges from about 800 feet in Onondago county, N. Y. (Pursh and others) to 700 feet near South Pittsburg, Tenn. (Cheatham). [*Alleghanian; Carolinian.*]

CAMPTOSORUS RHIZOPHYLLUS (L.) Link. Ranges from sea level in New Jersey and New York to 3,000 feet near Blowing Rock, N. C. (Small and Heller); occurs at 2,500 feet in Smith county, Va. (Small); at 100–500 feet in Northern Vermont (Faxon, Brainerd). [*Carolinian; Alleghanian.*]

PHEGOPTERIS DRYOPTERIS (L.) Fee. Ranges from 500? feet in Western New Jersey to 2,000 feet at Onteora, N. Y. (Miss Vail); occurs at 1,000 feet in Hampshire county, W. Va. (J. D. Smith); at 1,100 feet in Luzerne county, Pa. (Heller); at 1,300 feet at Westmore, Vt. (Deane); at 2,000 feet at Randolph, N. H. (Churchill). [*Alleghanian.*]

PHEGOPTERIS HEXAGONOPTERA (L.) Fee. Ranges from near sea-level along the Northern Atlantic coast to 4,000 feet on Roan Mt., N. C. (Britton); occurs at 600 feet at Florence, Ala.

(Mohr); at 2,400 feet near Marion, Va. (Mrs. Britton); at 2,700 feet in Garrett county, Md. (J. D. Smith); at 500 feet in Northern Vermont (Brainerd). [*Louisianian; Carolinian; Alleghanian.*]

PHEGOPTERIS PHEGOPTERIS (L) Underw. (*Phegopteris polypodioides* Fee.) Ranges from 600 feet at Newton, N. J. (Miss Thompson) to 4,000 feet in Northern Vermont (Pringle); occurs at 2,000 feet in Monroe county, Pa. (Mrs. Britton); at 2,200 feet at Onteora, N. Y. (Miss Vail); at 2,500 on Willoughby Mt., Vt. (Rusby). [*Alleghanian; Canadian.*]

DRYOPTERIS BOOTTII (Tuckerm.) Underw. Ranges from sea level from New Jersey to Massachusetts, to 2,000 in Northern Vermont (Brainerd). [*Alleghanian.*]

DRYOPTERIS CRISTATA (L.) A. Gray. Ranges from near sea level, from New Jersey northward, to 2,700 feet in Garrett county, Md. (J. D. Smith); occurs at 2,000 feet on the Pocono Mt., Pa. (Porter); at 1,200 feet at Jaffrey, N. H. (Deane); at 1,300 feet at Westmore, Vt. (Deane). [*Carolinian; Alleghanian.*]

DRYOPTERIS CRISTATA, var. CLINTONIANA (D. C. Eaton) Underw. Ranges sea level from New Jersey northward to 1,300 feet at Westmore, Vt. (Deane). [*Carolinian; Alleghanian.*]

DRYOPTERIS FRAGRANS (L.) Schott. At 2,000–4,000 feet on Mt. Mansfield, Vt. (Faxon); descends to 750 feet near Shelburne, N. H. (Deane); to 400 feet on cliffs, Vt. (Pringle). [*Canadian; Alleghanian.*]

DRYOPTERIS GOLDIEANA (Hook.) A. Gray. Ranges from near sea level northward, (100 feet, Vt. (Pringle)), to 5,000 feet on White Top Mt., Va. (Britton); occurs at 3,500 feet in Swain county, N. C. (Beardslee and Kofoid); at 2,700 feet in Garrett county, Md. (J. D. Smith); at 1,200 feet in Blair county, Pa. (Porter); at 2,500 feet on Willoughby Mt., Vt. (Faxon). [*Alleghanian; Canadian.*]

DRYOPTERIS MARGINALIS (L.) A. Gray. Ranges from sea level along the Atlantic coast from New Jersey northward to 5,000 feet on White Top Mt., Va. (Small); occurs at 1,800 feet on Lookout Mt., Ala. (Mohr); at 4,200 feet on Blowing Rock Mt.,

N. C. (Small and Heller); at 2,700 in Garrett county, Md. (J. D. Smith); at 2,000 feet at Onteora, N. Y. (Miss Vail); at 1,000 feet in Northern Vermont (Brainerd). [*Louisianian; Carolinian; Alleghanian; Canadian.*]

DRYOPTERIS NOVEBORACENSIS (L.) A. Gray. Ranges from sea level along the Atlantic coast, from N. C., northward, to 5,000 feet on White Top Mt., Va. (Mrs. Britton); occurs at 650–900 feet in Northern Alabama (Mohr); at 2,200 feet, near Marion, Va. (Mrs. Britton); at 2,700 feet in Garrett county, Md. (J. D. Smith); at 2,000 feet on the Pocono Mt., Pa. (Porter); at 2,200 ft., Onteora, N. Y. (Miss Vail); at 1,500 feet in Northern Vermont (Brainerd). [*Alleghanian; Canadian?*]

DRYOPTERIS SPINULOSA (Retz.) Kuntze. Ranges from near sea level in New York and New Jersey to 2,600–5,000 feet on White Top Mt., Va. (Mrs. Britton); occurs at 2,700 feet in Garrett county, Md. (J. D. Smith); at 2,200 on the Pocono Mt., Pa. (Porter); at 2,000 feet at Onteora, N. Y. (Miss Vail); at 500 feet in Northern Vermont (Brainerd); at 5,000 feet on Mt. Adams, N. H. (Deane). [*Alleghanian; Canadian.*]

DRYOPTERIS SPINULOSA, var. DILITATA (Hoffm.) Underw. Ranges from 500 feet in Northern New Jersey, northward to 6660 feet on Clingman's Dome, N. C. (Beardslee and Kofoid); occurs at 6,000 feet on Grandfather Mt., N. C. (Small and Heller); at 5678 feet on White Top Mt., Va. (Miss Leeming); at 2,300 feet on the Pocono Mt., Pa. (Porter); at 2,600 feet at Avalanche Pass, N. Y., (Britton); at 4,500 feet on the mountains of New England (Deane, Faxon, Brainerd, Pringle). [*Alleghanian; ; Canadian.*]

DRYOPTERIS SPINULOSA, var. INTERMEDIA (Muhl.) Underw. Ranges from near sea level from New Jersey northward to 5,000 feet on White Top Mt., Va. (Mrs. Britton); occurs at 2,000 feet on the Pocono Mt., Pa. (Porter); at 2,000 feet at Onteora, N. Y. (Miss Vail); at 5,000 feet on the mountains of New England (Faxon, Brainerd, Pringle, Deane). [*Alleghanian; Canadian.*]

DRYOPTERIS THELYPTERIS (L.) A. Gray. Ranges from sea level along the Atlantic coast to 2,000 feet in Northern Vermont (Brainerd); occurs at 300 feet in Baltimore county, Md. (J. D.

Smith); at 700 feet at Shelburne, N. H. (Deane). [*Louisianian; Carolinian; Alleghanian.*]

POLYSTICHUM ACROSTICHOIDES (Michx.) Schott. Ranges from near sea level along the Atlantic coast to 2,700 feet in Garrett county, Md. (J. D. Smith); occurs at 2,000 feet in Rabun county, Ga. (Small); at 2,400 feet near Marion, Va. (Judge Brown); at 2,000 feet at Onteora, N. Y. (Miss Vail); at 2,000 feet in Northern Vermont (Pringle, Deane). [*Louisianian; Carolinian; Alleghanian.*]

POLYSTICHUM ACROSTICHOIDES, var. SCHWEINITZII (Beck.). Near sea level in New Jersey; ascends to 1,500 feet in Habersham county, Ga. (Small); to 2,000 feet on the Pocono Mt., Pa. (Mrs. Britton); to 2,500 feet at Onteora, N. Y. (Miss Vail). [*Alleghanian.*]

POLYSTICHUM BRAUNII (Spenner). (*Aspidium Braunii, Spenner.*) Ranges from 2,000 feet on North Mountain, Sullivan county, Pa., to 5,000 feet at Randolph, Vt. (Churchill); descends to 1,000 feet at Ferrisburg and Williamstown, Vt. (Faxon, Pringle). [*Alleghanian; Canadian.*]

CYSTOPTERIS BULBIFERA (L.) Bernh. Ranges from near sea level northward to 3,500 feet at Mountain Lake, Va. (Britton); occurs at 1,000 feet in Winston county, Ala. (Mohr); at 1,300 feet on Willoughby Mt., Vt. (Deane). [*Carolinian; Alleghanian.*]

CYSTOPTERIS FRAGILIS (L.) Bernh. Ranges from near sea level along the Atlantic and Gulf coasts to 5,000 feet on Mt. Washington, N. H. (Faxon); occurs at 1,000 feet in Winston county, Ala. (Mohr); at 3,000 feet on Pond Mt., Va. (Miss Cathcart); at 2,700 feet in Garrett county, Md. (J. D. Smith); at 2,700 feet at Avalanche Pass, N. Y. (Britton); at 3,000 feet in Northern Vermont (Pringle, Faxon). [*Louisianian; Carolinian; Alleghanian; Canadian.*]

CYSTOPTERIS FRAGILIS, var. DENTATA, Hook. Ranges from 300 feet in Lancaster county, Pa. (Porter), to 5,500 feet on Roan Mt., N. C. (J. D. Smith). [*Alleghanian; Canadian?*]

ONOCLEA SENSIBILIS L. Ranges from sea level along the Atlantic and Gulf coasts to 3,200 feet in Preston county, W. Va. (J. D.

Smith); occurs at 2,100 feet in Smith county, Va. (Mrs. Livermore); at 2,000 feet at Onteora, N. Y. (Miss Vail); at 1,200 feet at Jaffrey, N. H. (Deane); at 1,000 feet in Northern Vermont (Brainerd, Pringle.) [*Louisianian; Carolinian; Alleghanian.*]

ONOCLEA STRUTHIOPTERIS (L.) Hoffm. Ranges from near sea level along the northern Atlantic coast, (New Jersey and northward), to 2,000 feet at Willoughby, Vt. (Rusby); ascends to 1,200 feet in Bald Eagle Valley, Pa. (Porter). [*Alleghanian.*]

Woodsia alpina (Bolton.) S. F. Gray (WOODSIA HYPOBOREA R. Br.). At 2,000–4,200 feet on Mt. Mansfield, Vt. (Faxon, Pringle); descends to 2,000 feet on Mt. Willoughby, Vt. (Faxon, Pringle). [*Canadian.*]

WOODSIA GLABELLA R. Br. At 4,000 feet on Mt. Mansfield, Vt. (Faxon); descends to 1,500 feet on the same mountain (Pringle); to 1,000–2,500 feet at Willoughby, Vt. (Faxon); to 900 feet at Gorham, N. H. (Deane). [*Canadian; Alleghanian?.*]

WOODSIA ILVENSIS (L.) R. Br. Ranges from near sea level from Northern New Jersey northward to 5,000 feet on Mt. Lincoln, N. H. (Faxon); occurs at 5,000 feet at Randolph, N. H. (Churchill); at 3,000 feet on Mt. Mansfield, N. H. (Faxon); at 2,000 feet at Crawford Notch, N. H. (Faxon); at 900 feet at Gorham, N. H. (Deane); at 1,800 feet at Plattekill Clove, N. Y. (Miss Vail); at 700 feet in Lycoming county, Pa. (Small & Heller); at 250 feet in Bucks county, Pa. (Porter). [*Alleghanian; Canadian.*]

WOODSIA OBTUSA (Spreng.) Torr. Ranges from near sea level in Northern New Jersey and northward to 2,200 feet at Broad Ford, Va, (Mrs. Britton); occurs at 1,000 feet in Winston county, Ala. (Mohr); at 1,500 feet in Alleghany county, Md. (J. D. Smith); at 1,000 feet in Northern Vermont (Brainerd). [*Alleghanian.*]

DICKSONIA PUNCTILOBULA (Michx.) A. Gray. Ranges from near sea level along the Atlantic coast from New Jersey northward to 5,678 feet on White Top Mt., Va. (Small); occurs at 1,200 feet in Winston county, Ala. (Mohr); at 4,500 feet on Blowing Rock Mt., N. C. (Small & Heller); at 2,700 feet in Garrett

county, Md. (J. D. Smith); at 2,000 feet on the Pocono Mt., Pa. (Porter); at 2,000 feet at Onteora, N. Y. (Miss Vail); at 2,000 feet in Northern Vermont (Brainerd). [*Carolinian; Alleghanian; Canadian.*]

TRICHOMANES PETERSI A. Gray. At 1,000 feet along Black Creek, Etowah county, Ala. (Mohr), and from 1,000–1,200 feet along the Sipsey River, Ala. (Peters). [*Carolinian.*]

TRICHOMANES RADICANS Swartz. At 600 feet in Marion county, Ala. (Mohr); at 1,000 feet in Hale county, Ala. (E. A. Smith); at 1,000 feet in Winston county, Ala. (Mohr). [*Louisianian; Carolinian.?*]

LYGODIUM PALMATUM (Bernh.) Swartz. Ranges from near sea level in Massachusetts and New Jersey to 2,100 on the Pocono Plateau, Pa. (Porter). [*Alleghanian.*]

OSMUNDA CINNAMOMEA L. Ranges from sea level along the Atlantic coast to 5,678 feet on White Top Mt., Va. (Mrs. Britton); occurs at 3,000 feet in Rabun county, Ga. (Small); at 2,700 feet in Garrett county, Md. (J. D. Smith); at 2,000 feet on the Pocono Mt., Pa. (Porter); at 2,000 feet in Greene county, N. Y. (Miss Vail); from 90–1,000 feet in Northern Vermont (Pringle, Brainerd). [*Louisianian; Carolinian; Alleghanian; Canadian.*]

OSMUNDA CINNAMOMEA, forma FRONDOSA (A. Gray). Britton. Ranges from sea level in New Jersey and New York to 3,000 feet on Pine Mt., Grayson county, Va. (Small). [*Carolinian; Alleghanian.*]

OSMUNDA CLAYTONIANA L. Ranges from sea level along the Northern Atlantic coast (New Jersey to Maine) to 5,000 feet on White Top Mt., Va. (Mrs. Britton); occurs at 2,700 feet in Garrett county, Md. (J. D. Smith); at 2,000 feet on the Pocono Mt., Pa. (Porter); at 2,200 feet near Onteora, N. Y. (Miss Vail); from 90–1,000 feet in Northern Vermont (Brainerd, Pringle), and from 700–1,000 feet in Coos county, N. H. (Deane). [*Alleghanian.*]

OSMUNDA REGALIS L. Ranges from sea level along the Atlantic coast to 3,000 feet on Brushy Mt., Va. (Small); occurs at 2,700

feet in Garrett county, Md. (J. D. Smith); at 2,000 feet on the Pocono Mt., Pa. (Porter); at 2,000 feet at Onteora, N. Y. (Miss Vail); from 90–1,000 feet in Northern Vermont (Pringle, Brainerd); at 1,000 feet in Coos county, N. H. (Deane). [*Louisianian; Carolinian; Alleghanian.*]

Notes upon various Species of Iridaceæ and other Orders.

By Thomas Morong.

IRIDACEÆ.

Two species of *Iris* must be added to the list of those within the range of A. Gray's Manual, Ed. 6, and one other if Canada be included.

Iris Germanica, L., the great violet-colored flag of Middle Europe, was found by Mr. A. A. Heller during the last year apparently well established near Mt. Crawford, Western Virginia. Probably a garden escape.

Iris Missouriensis, Nutt. (*I. Tolmieana*, Herb.) occurs in Missouri and Nebraska, and more commonly towards the southwest.

Iris Hookeri, Penny, Steud. Nom. Bot. Pt. 1, 822 (1840). This has been established as a good species by Mr. Watson (Coult. Bot. Gaz. xii. 100). It occurs in Newfoundland and along the lower St. Lawrence (Pringle). *I. Canadensis*, which one might at first thought imagine it to be, has not yet been identified. This, as nearly as we can judge, is merely a form of *I. versicolor*, L., but may prove distinct when we come to understand the Canadian species more thoroughly.

Iris tridentata, Pursh, not hitherto detected in our territory, is most commonly called *I. tripetala*, Walter, but Walter's name is antedated by *I. tripetala*, L. f. Supp. 97 (1781), a different species, now transferred to *Moræa*, but remaining a synonym nevertheless.

Sisyrinchium.

The species of the Atlantic States should be termed *S. Bermudianum*, L., in spite of the fact that it is not known to occur in Bermuda, as this was undoubtedly the original name given to it

by Linnæus. In Sp. Pl. 954, he mentions two forms: "$_{\alpha}$ *S. Bermudiana*," which he says grows in Virginia, and "$_{\beta}$ *S. Bermudiensis*," which is attributed to the Bermudas. The first is founded upon Plukenet's t. 61, f. 1, and Dillenius' t. 41, f. 49, both of which are evidently our plant, and the habitat cited is Virginia. It differs very essentially from *S. Bermudiense*, the Bermudan plant. Linnæus apparently had not seen this latter plant, as no specimen of it is preserved in his Herbarium (*teste* Hemsley, Brit. Journ. Bot. xxii. 109).

As to the question whether there are two or more species in the Atlantic States, I am very well satisfied after a careful study of all the forms that so far we cannot be sure of more than one. The distinctions made between *S. angustifolium*, Mill. and *S. anceps*, Cav. do not seem to hold. Both have from one to several peduncles, and both have seeds nearly smooth, faintly and deeply pitted. Abundant specimens of both, contained in the Herbarium of Columbia College, as well as specimens collected fresh in the vicinity of the city of New York, show this to be the fact.

S. mucronatum, Mx, is merely a narrow-winged form of *S. Bermudianum*. It seems to me that Dr. Asa Gray, in the first edition of his Manual, named the plant correctly, regarding *anceps* and *mucronatum* merely as forms of *S. Bermudianum*.

The synonymy will stand as follows:

S. Bermudianum, L. Sp. Pl. 954 (1753).
S. angustifolium, Mill. Dict. (1768).
S. anceps, Cav. Diss. 6, 345, t. 190, f. 2 (1788).
S. gramineum, Curtis, Bot. Mag. t. 464 (1799).
S. mucronatum, Mx. Fl. ii. 33 (1803).

ORCHIDACEÆ.

In an article contained in the BULLETIN OF THE TORREY BOTANICAL CLUB, xx. 31, the writer maintained the essential identity of *Habenaria ciliaris* (L.) R. Br. and *Habenaria blephariglottis* (Willd.) Torr.

On the 23d of last July I had a good opportunity to compare the two, then in flower, growing side by side on Staten Island, New York. A critical study of the plants in fresh blossom has led me to modify my opinion to some extent. The thing which

had puzzled me the most in my first examination was an intermediate form bearing yellow flowers, with both naked and fringed or cut-toothed petals, *H. blephariglottis* being described in the books as having only white petals with naked margins. Of this intermediate form I found several examples mixed among the two species. This I now believe is a hybrid, and fully accounts for the apparent running together of the two. The real *ciliaris* and *blephariglottis* are perhaps sufficiently distinct to be regarded as separate species. The latter has somewhat smaller, pure white petals, a narrower, oblong tip, and flowers three or four days earlier than *ciliaris* In *ciliaris* the lip broadens in the middle and the corolla is of a deep yellow or orange tint. So far as size and habit, the margins of the petals and the fringe of the lip are concerned, scarcely any distinction between the two seems to exist, and they must be regarded as very closely related. The fact that they hybridize, if nothing else, would show this to be the case.

In that article I also noticed a monstrous form of *H. ciliaris*, obtained by Mr. Henry Ogden in the vicinity of New York. I have now to mention still another irregularity of this species. Mrs. J. C. Wright, of Fairfield, Conn., sends us a proliferous form which has four additional racemes of flowers growing from the summit of the regular raceme. The plant is normal in other respects.

COMMELINACEÆ.

Commelina communis, L., not noted in Gray's Manual. Occurs extensively in and around the city of New York, and along the Susquehanna River in Pennsylvania, from its mouth to the hills above Harrisburg. It may readily be distinguished from *C. Virginica*, L., by its spathe, which is split to the base, and by its glabrous, or nearly glabrous, stem and leaves, and from *C. nudiflora*, L., by its open spathe, generally much broader leaves and more robust habit, as well as by the much larger seeds of the ventral cell, which are rugose and deeply pitted instead of being merely reticulated as in *C. nudiflora*. This species is usually regarded as introduced, but as the writer found it this summer on the Susquehanna, it has every appearance of being native. In this connection, it is worthy of note that Linnæus gives its habitat as "America."

TRADESCANTIA.

Four well marked species of this genus are found within our bounds:

Tradescantia rosea, Vent., occurring from Maryland to Florida and west to Missouri and Texas.

Tradescantia Virginiana, L., not *T. Virginica*, as usually written.

Tradescantia pilosa, Lehm., Nov. Act. Ac. Caes. Leop. xiv. Pt. 2, 822, t. 48 (1828).

This is a good species, entirely distinct from *T. Virginiana*. It has stout stems which are more or less pubescent or pilose, often flexuous (*T. flexuosa*, Raf.), and is especially distinguished by its numerous umbels (1–7), commonly dense and many-flowered, terminal and axillary or on axillary branches. Pedicels and sepals usually glandular hairy. Mr. Eggert, of St. Louis, Mo., in sending specimens from his neighborhood, writes that it has larger leaves and more numerous flowers and blossoms much later than *T. Virginiana* (July).

Tradescantia brevicaulis Raf. Atl. Jour. 150 (1832). Probably the plant named "*T. Virginica*, var. *villosa*, Watson," in Gray's Manual, Ed. 6. This should not be confounded with *T Virginiana*, as it is clearly distinct. A dwarf plant, one to six inches high, or oftentimes acaulescent. The stem, leaves, pedicels and calyx are pilose with long spreading hairs which are seldom if ever glandular. The leaves are narrow and sometimes 12 inches in length; the bracts wider and often larger. Umbels 4 to 12-flowered, with rays 1 to 2 inches long. Corolla rather small, blue or rose-purple.

Mr. Eggert collected this form in Missouri, and writes that it grows on rocky hillsides, and blossoms very early, scarcely any flowers to be seen by the end of May. Rafinesque reports it from Illinois and Kentucky.

SCITAMINEÆ.

Thalia dealbata, Roscoe, recently received from Mr. Eggert, grows in the swamps of Missouri.

AMARYLLIDACEÆ.

Hymenocallis occidentalis (Leconte) Kunth. Specimens of this,

obtained the last summer in Missouri by Mr. Eggert, raise the question anew whether we have more than one species in the Atlantic States. Mr. Watson, in Proc. Am. Ac. xiv. 301, describes two species, *H. Palmeri*, S. Wats. and *H. humilis*, S. Wats. as occurring in Florida. Leconte notes four other species growing in the States just north of Florida, of which he writes full and elaborate descriptions, accompanied by excellent drawings of three of them. These species he names *Pancratium Mexicanum*, *P. rotatum*, *P. coronarium* and *P. occidentale*. The last species he assigns to Georgia, Tennessee and Kentucky, and this without much doubt is the same as the Illinois and Missouri plant. As Leconte was a very accurate observer and better acquainted with the habits and forms of these plants than any writer since his time, I have no doubt that he is correct in his conclusions, whether his names are to be adopted or not. Whether any of his species is the old *P. Carolinianum* of Linnæus or not has long been a mooted question. The species of Linnæus is founded upon Catesby's figure (Nat. Hist. Car. i. App. 5), deseribed by Catesby as "Lilio-Narcissus Polianthos," and seen by him in a "bog near Palluchucula, an Indian town on the Savannah river, Georgia." Nothing just like this figure has been found since.

The border of the staminal cup is represented with 2 and 3 large triangular teeth between each pair of stamens, and the flower cluster with 2 spathe-like bracts at the base. Some botanists are disposed to regard this as a rude drawing of *H. rotata* or *H. occidentalis*, while others (*e. g.* Baker in Amaryll. 113) consider it *P. maritimum*, a common European species. Neither Walter nor Elliott profess to have seen it, nor is it contained in any American or European Herbarium. For the present, therefore, we are compelled to regard it as a myth.

H. occidentalis seems quite clearly distinct from *H. lacera*, Salisb. (*H. rotata*, Herb.) which Mr. Watson in the work cited above regards as probably the original of the Linnæan plant.

HÆMODORACEÆ.

Of this order as now arranged by Engler and Prantl, we have only a single genus in this country, namely, GYROTHECA, Salisb. Trans. Lin. Soc. i. 327 (1815).

Heritiera, Gmel. (1791) which Kuntze substitutes for Elliott's *Lachnanthes* had been used two years previously by Dryander (Ait. Hort. Kew. iii. 456) for a genus of the Sterculiaceæ. The older names for Dryander's genus cited by Kuntze, such as *Amygdalus*, Burm. and *Atunus*, Rumpf. are pre-Linnæan. The next in priority appears to be *Gyrotheca*.

A single species only is known:

Gyrotheca capitata (Walt.). It is a little singular that Walter's specific name has been changed into "tinctoria" by all the writers who have quoted him, from Pursh to Kuntze. The plant is placed by Walter among his "Anonymo" genera, the term he uses when he is doubtful about the genus, but his description is so full that no one can doubt what is meant.

The synonymy will stand as follows:

Gyrotheca capitata (Walt.).
Anonymo capitata, Walt. Fl. Car. 68 (1788).
Dilatris Caroliniana, Lam. Ill. i. 127 (1791).
Heritiera Gmelini, Michx. Fl. i. 21 (1803).
Dilatris tinctoria, Pursh, Fl. 30 (1814).
Gyrotheca tinctoria Salisb. Trans. Hort. Soc. i. 327 (1812).
Lachnanthes tinctoria Ell. Sk. i. 47 (1817).
Heritiera tinctoria (Gmel.) Kuntze, Rev. Gen. 699 (1891).

NAIADACEÆ.

Potamogeton Spirillus, Tuckerm. In Britten's Journal of Botany for October, 1893, Mr. A. Bennett, commenting upon my adoption of Tuckerman's name for this species, advances the opinion that it should be called *P. dimorphum*, Raf., on the ground that Rafinesque in his review of Barton's Flora of 1815 in the Monthly Magazine and Critical Review of 1817 proposes this name in the place of *P. diversifolius* used by Barton for what he considers a new species, since that name had already been applied by Rafinesque himself to Michaux's *hybridus*. I should agree to this if we could be sure that Barton meant by his description in 1815, supplemented by his drawing and description in 1823, the plant which we now know as *Spirillus*. I must differ from Mr. Bennett, however, in thinking that *P. Spirillus* was meant. The figure of Barton represents a plant, as Barton himself puts it, with "sub-

mersed leaves very delicately filiform," some of those in the plate being over two inches in length. These are exactly the leaves of *P. diversifolius*, Raf. (*P. hybridus*, Michx.), and unlike those of *Spirillus* which are much shorter and broader. The only spikes of fruit shown are emersed ones which are figured as sessile. Now neither *diversifolius* nor *Spirillus* ever has emersed sessile spikes, but they are on peduncles from two to nine lines in length, and usually several times longer than the submersed ones. No Potamogeton answering to this figure in all respects has, so far as I know, been detected since Barton's day either in New Jersey, his locality, or anywhere else in the United States. New Jersey has been pretty thoroughly searched from one end to the other, and we should have been very likely to have seen this erratic form were it there. I am compelled to believe that in spite of his assertion to the contrary, Barton really had some form of Michaux's *hybridus* in hand. In the course of his article Mr. Bennett makes a fling which is unworthy of him, and which I have most certainly done nothing to provoke. He says (p. 295): "but the 'law' that is desired to be forced on us, 'that any species or variety that has been so named under any other species or variety cannot be used in the same genus,' will be of somewhat difficult application. Students certainly will never know, and even monographers will not be safe, as proved by Dr. Morong's own work, where he must (by his own law) change the names of at least three of his species, having failed to ascertain that they were in use before." Mr. Bennett seems to hold me responsible for this "law," whereas it is a rule of nomenclature adopted by our National Association of botanists at their meeting at Madison last August, a meeting at which I was not present, and did not influence in the least. I certainly do approve of it as a good rule, under what is termed the law of priority, a law which Mr. Bennett himself must acknowledge as sound, or his anxious search after the earliest names is useless. I think it would be difficult for Mr. Bennett to show that American botanists have ever manifested a desire to force this or any of their rules in nomenclature upon anybody either in this country or abroad. Certainly we shall lose no sleep if our British cousins choose to follow a different set of rules.

Notes on the Flora of Southeastern Kentucky, with a List of Plants collected in Harlan and Bell Counties in 1893.

By T. H. Kearney, Jr.

Last summer while debating the weighty question of the selection of a field for botanical exploration, it occurred to me that the mountain counties of Southeastern Kentucky presented a desirable region. Here was a country almost overlooked by the collector. Since Rafinesque made his journey to the "Wasioto or Cumberland Mountains," little work had been done in that part of the State. Moreover, the position of that country on the southern edge of the northern flora, as usually defined, seemed to promise the finding of southern plants new to the northern range.

Unfortunately I was unable to get into the field before the first of August. Leaving Knoxville on that date, I went to Pennington's Gap, Va., on a branch of the L. & N. R. R. Here I secured the services of a negro, a team of mules and a wagon, and by means of this combination reached Harlan C. H., Ky., after a ride of twenty-five miles over the roughest road imaginable.

Leaving Pennington's, we followed the North Fork of Powell's River through the gap in the main range of the Cumberland Mountains. Then the road crossed Little Black Mountain, a parallel ridge, and descended gradually into the valley where the three "forks" unite to form the Cumberland River.

Harlan "Town" proved to be a fair type of the Southern mountain village—dirty, exceedingly ugly and thoroughly lawless. A stay of a few days here convinced me that I must get further into the mountains to secure good results, though at least one plant of interest, *Viola villosa*, Walt., was found here. It is a well marked species, and no one who has seen it growing would consider it otherwise. The roundish, cordate or reniform leaves lie flat on the ground. The appressed pubescence of the upper surface gives it a silvery appearance. The under surface is purplish on the veins, or sometimes the whole surface has a purple hue. In the same vicinity, *Clethra acuminata*, Michx., *Oxalis recurva*, Ell., *Magnolia tripetala*, L. and *Houstonia tenuifolia*, Nutt. were collected.

From Harlan I went up the Poor Fork of the Cumberland, by the same primitive conveyance, to Poor Fork Postoffice, about twenty-one miles above Harlan. Here, at the house of the worthy and hospitable postmaster, I stayed for nearly a month.

The Poor Fork flows through a narrow valley between two ranges of the Cumberland system, the Big Black and the Pine Mountain. The Big Black Mountain is over 3,000 feet high at points; the Pine is much lower. In geological formation, the district is almost entirely sandstone and shale. On the Pine there is an occasional outcropping of limestone.

In the immediate vicinity of Poor Fork I collected *Campanula divaricata*, Michx., *Hydrastis Canadensis*, L., *Panicum capillare campestre*, Gattinger, and *Panicum ramulosum*, Michx. (growing on moist shale on the river bank). A form of *Acalypha Virginica* L. with every part, even the bracts, much reduced in size, was abundant in a low, sandy field.

On the Big Black Mountain, *Azalea lutea*, L.; *Galium latifolium*, Michx.; *Carex aestivalis*, M. A. Curtis; *Trautvetteria Carolinensis* (Walt.) A. M. Vail; *Astilbe biternata* (Vent.) Britt. (*A. deandra*, Don.) and *Holcus lanatus*, L., appeared.

On a spur of the Big Black known as Benham's Spur, *Panax quinquefolia*, L.; *Thalictrum coriaceum* (Britt.) Small*; *Aruncus Aruncus* (L.) Karst.; *Magnolia Fraseri*, Walt.; *Hystrix Hystrix* (L.) MacMillan, and *Corycarpus diandrus* (Michx.) Kuntze were found.

The Pine Mountain presented a more varied and interesting flora. *Magnolia macrophylla*, Michx., very conspicuous because of the whitened under surface of its huge leaves, with large ovoid or semi-globose cones of a dull flesh-color, *Solidago erecta*, Pursh, *Aster leiophyllus lanceolatus*, Porter, *Meibonnia laevigata* (Nutt.) Kuntze, *Clintonia umbellata* (Michx.) Torr., *Disporum lanuginosum* (Michx.) Britt. and *Pogonia trianthophora* (Sw.) B. S. P. were collected on its slopes.

A ledge of exposed, dry sandstone at the summit yielded *Capnoides sempervirens* (L.) Borkh., *Lechea racemulosa*, Michx., rather depauperate specimens of *Gnaphalium Helleri*, Britt., *Eupatorium*

* Mem. Torr. Club, iv. 96.

pubescens, Muhl., *Agrostis intermedia*, Scribn.,* *Panicum commutatum latifolium* Scribn. n. var.† and a *Lysimachia*, nearest to *L. radicans*, but differing in its erect habit and broader and shorter leaves, less pointed at either end.

On the shaded north side of this ledge *Heuchera Rugelii*, Shuttlew., *Peramium pubescens* (Willd.) C. C. Curtiss, *Leptorchis liliifolia* (L.) Kuntze, and *Asplenium montanum*, Willd., were found.

After several weeks spent in the neighborhood of Poor Fork, I resolved to try the valley of the Cumberland at some point further down. Leaving my quarters in Harlan county, I had a two days' ride over an abominable road to Wasioto, a small lumber town fifty-five miles below Poor Fork Postoffice, and about one mile above Pineville, the county-seat of Bell county.

Along the road I saw great quantities of *Panicum flexile* (Gattinger) Scribn.,‡ a species resembling *P. capillare*, but very distinct.

About nine miles above Wasioto the Cumberland enters a gorge locally known as the "Narr's" (Narrows), through which it flows for several miles. Here, on the bluffs, many interesting plants were collected. Among them I would mention *Rubus odoratus*, L., *Stuartia pentagyna*, L'Hér., *Scutellaria saxatilis*, Riddell, *Aster prenanthoides*, Muhl., and a *Houstonia* which I refer, doubtfully, to Pursh's *H. tenella*.§

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* "Spikelets not crowded, pedicels capillary, usually much longer than the spikelets; flowering glume about ¾ line long, sometimes with a short and delicate dorsal awn.

"Culms erect or geniculate below, 2–3 ft. high; leaves spreading, 2–6 lines wide, the uppermost 4–8 in. long; panicle 7–14 in. long, pyramidal, the rather firm branches at first erect, those uppermost often spreading while the base of the panicle is yet included in the loose, upper leaf-sheath. Spikelets less crowded and smaller than in *A. elata*, with the flowering glume broader at the more rounded apex.

"Intermediate between *A. elata* and *A. perennans*."

† "Leaves very broad, panicle large, the widely spreading branches few-flowered."

‡ *Panicum capillare flexile*, Gattinger, Cat. Tenn. Fl., 94 (1887).

§ *Houstonia tenella*, Pursh, Fl. Am. Sept. 106?

Aspect and habit of *H. serpyllifolia*. Perennial by extensively creeping, filiform rootstocks. Stems slender, smooth, much branched. Leaf 5–7 mm. long, oblong-spatulate, obtuse or slightly pointed at apex, tapering into a slender petiole from one-fourth to twice as long, conspicuously veined; the upper surface, with the margin and petiole, furnished with scattered, strigose, white hairs; flowers few on very long peduncles, deep blue, about one-half as large as those of *H. serpyllifolia;* tube of corolla very slender, about twice as long as the lobes and 3 to 4 times as long as the lobes of the very small calyx. Mature fruit not seen.

For the entire fifty miles between Poor Fork and Wasioto, the Pine Mountain remains the same in height and character. It is only broken at Wasioto, where the Cumberland passes through it. The Black Mountain, however, breaks up into a number of lesser ridges, of which the chief is known as the Log Mountain.

The Pine still proved the most interesting collecting ground. In a ravine on the south slope, a single specimen of the rare and little-known *Gaylussacia ursina* (M. A. Curtis) Torr. & Gray, a much branched shrub about 1 m. in height, was found. The best it could yield in the way of inflorescence or fruit was a few clusters of apparently unfertilized ovaries. *Lobelia puberula*, Michx., *Galax aphylla*, L., and the magnificent grass, *Erianthus contortus*, Ell., also appeared in the ravine.

On the dryer ridges of the Pine, *Eupatorium verbenæfolium*, Michx., *Chrysopsis graminifolia*, Nutt., *Juncus biflorus*, Ell., and an interesting little *Panicum* with membranaceous leaf-margins, *Panicum nitidum crassifolium*, A. Gray, possibly Elliott's *P. ciliatum*, flourished. In the richer soil of the north slope grew *Aristolochia Sipho*, L'Hér., *Pyrularia pubera*, Michx., *Cimicifuga Americana*, Michx. and *Eupatorium sessilifolium* L.

In the neighborhood of Wasioto, a well-marked variety of *Panicum capillare*, *Panicum capillare geniculatum* Scribn.,* was found to be frequent in the loose soil of railroad embankments.

On Clear Creek, *Oxypolis rigida* (L.), Raf.,† *Solidago arguta*, Ait., *S. patula*, Muhl. and *S. Curtisii*, Torr. & Gray, were collected. On dry slate along the same stream *Phyllanthus Carolinensis*, Walt., and *Aster dumosus*, L., were found.

Towards the end of September I left Kentucky, regretting much that circumstances had not permitted me to begin collecting earlier in the season in a country whose flora would seem to promise so much of interest.

Appended is a complete list of the plants collected in Bell and

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* "Culms usually prostrate or ascending, geniculate or much branched, with numerous oblong or ovate diffusely branched panicles. Spikelets more numerous than in var. a [the ordinary form]. This corresponds to var. *geniculatum* of *P. proliferum*."

† *Tiedemannia rigida*, Coult. and Rose.

Harlan counties. For the names of the grasses I am indebted to Prof. F. Lamson-Scribner.

176. *Asplenium montanum*, Willd.
323. *Asplenium Trichomanes*, L.
48, 210, 395. *Camptosorus rhizophyllus* (L.) Link.
47. *Cystopteris fragilis* (L.) Bernh.
142. *Dicksonia punctilobula* (Michx.) A. Gray.
389, 573. *Dryopteris intermedia* (Muhl.) A. Gray.
61. *Dryopteris marginalis* (L.) A. Gray.
211. *Dryopteris Novæboracensis* (L.) A. Gray.
129. *Polypodium vulgare*, L.
566. *Pteris aquilina*, L.
130. *Tsuga Canadensis* (L.) Carr.
2, 134, 436. *Alisma Plantago*, L.
187. *Sagittaria latifolia*, Willd.
23. *Agrostis alba*, L., var.
221, 283, 367, 382. *Agrostis elata*, Trin. (?)
39, 174. *Agrostis intermedia*, Scribn.
381. *Agrostis perennans*, Tuckerm.
384. *Andropogon nutans*, L.
364, 377. *Andropogon provincialis*, Lam.
379. *Andropogon scoparius*, Michx.
313, 368. *Aristida gracilis*, Ell.
314. *Aristida purpurascens*, Poir.
365. *Arundinaria gigantea tecta* (Walt.) Scribn. [*Arundo tecta*, Walt.].
36, 74, 279. *Brachyelytrum erectum* (Schreb.) Beauv.
276. *Bromus ciliatus purgans* (L.) A. Gray.
375. *Cinna arundinacea*, L.
235. *Corycarpus diandrus* (Michx.) Kuntze.
43. *Danthonia spicata*, Beauv.
140. *Eleusine Indica* (L.) Gaertn.
236. *Elymus Canadensis*, L.
196, 263, 370. *Eragrostis capillaris*, Nees.
150. *Eragrostis Frankii*, Meyer.
55. *Eragrostis hypnoides* (Lam.) B. S. P.
28, 158. *Eragrostis Purshii*, Schrad.
385. *Erianthus contortus*, Ell.
93. *Holcus lanatus*, L.
371. *Homalocenchrus Virginicus* (Willd.) Britton.
237. *Hystrix Hystrix* (L.) MacMillan.
383, 578. *Muhlenbergia diffusa*, Schreb.
366. *Muhlenbergia Mexicana* (L.) Trin.
33, 234. *Muhlenbergia tenuiflora* (Willd.) B. S. P.
309, 380. *Panicum agrostidiforme*, Lam.
372. *Panicum anceps*, Michx.

151. *Panicum capillare campestre*, Gattinger.
317, 335, 378, 497. *Panicum capillare geniculatum*, Scribn.
152, 229. *Panicum clandestinum*, L.
34, 54. *Panicum commutatum*, Schultes.
299. *Panicum commutatum latifolium*, Scribn.
316, 425, 567. *Panicum filiforme*, L.
312, 579. *Panicum flexile* (Gattinger) Scribn.
53. *Panicum laxiflorum*, Lam.
52. *Panicum microcarpon*, Muhl.
594. *Panicum nitidum crassifolium*, A. Gray.
58, 141. *Panicum nitidum pubescens* (Chapm.) Scribn. [*Panicum laxiflorum pubescens*, Chapm]
315, 374. *Panicum proliferum*, Lam.
35, 50, 57. *Panicum ramulosum* Michx.
20. *Pañicum sanguinale*, L.
258, 298, 376. *Panicum Walteri*, Poir.
172. *Panicum* sp.
195, 253. *Paspalum læve*, Michx.
26, 56, 386. *Paspalum longepedunculatum*, Le Conte.
197. *Paspalum setaceum*, Michx.
373. *Sieglingia flava* (L.) Kuntze.
278, 369. *Sporobolus vaginæflorus* (Torr.) Vasey.
125. 155. *Carex æstivalis*, M. A. Curtis.
119. *Carex cephalophora*, Muhl.
319. *Carex crinita*, Lam.
156. *Carex rosea radiata*, Dewey.
73, 115. *Carex virescens*, Muhl.
281. *Carex* sp.
595. *Cyperus diandrus*, Torr.
201. *Cyperus flavescens*, L.
222, 318. *Cyperus retrofractus*, Torr.
204, 411. *Cyperus strigosus*, L.
463. *Dulichium spathaceum* (L.) Pers.
27, 202. *Eleocharis ovata* (Roth) R. Br.
46. *Kyllingia pumila*, Michx.
24, 205. *Rynchospora glomerata* (L.) Vahl.
428. *Scirpus cyperinus* (L.) Kunth.
149. *Scirpus debilis*, Pursh.
3. *Scirpus polyphyllus*, Vahl.
108. *Scleria pauciflora*, Muhl.
173, 466. *Scleria triglomerata*, Michx.
49, 97. *Fimbristylis capillaris* (L.) A. Gray.
448, 590. *Commelina nudiflora*, L.
21. *Juncus acuminatus*, Michx.
488. *Juncus biflorus*, Ell.
22, 37, 203. *Juncus marginatus*, Rostk.
582. *Chamaelirium Carolinianum*, Walt.

112, 295, 580. *Clintonia umbellata* (Michx.) Torr.
113, 178, 243. *Disporum lanuginosum* (Michx.) Britton.
132, 572. *Medeola Virginiana*, L.
190 *Polygonatum biflorum commutatum* (Schultes) Morong. [*Polygonatum commutatum*, Schultes.]
133, 348, 426. VAGNERA RACEMOSA (L.) Morong. [*Smilacina racemosa*, Desf.]
485. *Smilax glauca*, Walt.
337. *Smilax rotundifolia*, L.
297. *Achroanthes unifolia* (Michx.) Raf.
487. *Gyrostachys simplex* (A. Gray) Kuntze.
429. *Leptorchis liliifolia* (L.) Kuntze.
249, 430, 493. *Peramium pubescens* (Willd.) C. C. Curtiss.
105. *Pogonia trianthophora* (Sw.) B. S. P.
104. *Pogonia verticillata* (Willd.) Nutt.
7, 60. *Alnus serrulata*, Willd.
114, 165. *Betula lenta*, L.
72. *Carpinus Virginica* (Marsh.) Sudworth.
110. *Castanea dentata* (Marsh.) Sudworth.
181. *Fagus atropunicea* (Marsh.) Sudworth.
400. *Quercus alba*, L.
147. *Quercus Prinus*, L.
247. *Quercus tinctoria*, Bartr.
329, 443. *Adicea pumila* (L.) Raf.
336, 441. *Boehmeria cylindrica* (L.) Willd.
342, 533. *Laportea Canadensis* (L.) Gaud.
340, 584. *Pyrularia pubera*, Michx.
41, 84. *Aristolochia Serpentaria*, L.
286, 343, 516, 591. *Aristolochia Sipho*, L'Hér.
410. *Polygonum hydropiperoides*, Michx.
284. *Polygonum Pennsylvanicum*, L.
552. *Polygonum sagittatum*, L.
481. *Polygonum scandens*, L.
447, 515. *Polygonum Virginianum*, L.
70. *Mollugo verticillata*, L.
10, 78, 245. *Anychia Canadensis* (L.) B. S. P.
198. *Anychia dichotoma*, Michx.
32. *Sagina decumbens Smithii* (A. Gray) S. Wats.
209. *Magnolia Fraseri*, Walt.
310. *Magnolia macrophylla*, Michx.
18. *Magnolia tripetala*, L.
5. *Asimina triloba* (L.) Dunal.
575, 593. *Cimicifuga Americana*, Michx.
153. *Clematis Virginiana*, L.
244. *Hydrastis Canadensis*, L.
250, 290. *Thalictrum coriaceum* (Britt.) Small.
163. *Trautvetteria Carolinensis* (Walt.) A. M. Vail.
67. *Caulophyllum thalictroides* (L.) Michx.

6. *Menispermum Canadense*, L.
330, 444, 532. *Lindera Benzoin* (L.) Blume.
216. *Sassafras Sassafras* (L.) Karst.
123, 301. *Capnoides sempervirens* (L.) Borkh.
19. *Podostemon ceratophyllus*, Michx.
1, 128. *Penthorum sedoides*, L.
117. *Astilbe biternata* (Vent.) Britton.
81. *Heuchera Rugelii*, Shuttlew.
44. *Heuchera villosa*, Michx.
154, 294, 555. *Hydrangea arborescens*, L.
87. *Hamamelis Virginiana*, L.
168, 184, 289, 307. *Agrimonia striata*, Michx.
193. *Aruncus Aruncus* (L.) Karst.
71. *Cerasus serotina* (Ehrh.) Loisel.
305. *Cratægus coccinea*, L.
65. *Cratægus Crus-Galli*, L.
226. *Potentilla Monspeliensis*, L. [*P. Norvegica*, L.]
507. *Pyrus arbutifolia* (L.) L. f.
85. *Rosa humilis*, Marsh.
131, 326, 571. *Rubus odoratus*, L.
76. *Baptisia tinctoria* (L.) R. Br.
496. *Cassia nictitans*, L.
439. *Cercis Canadensis*, L.
100. *Clitoria Mariana*, L.
267. *Cracca Virginiana*, L.
328, 442, 558. *Falcata comosa* (L.) Kuntze.
127. *Lespedeza hirta* (L.) Ell.
300, 456, 492. *Lespedeza intermedia* (S. Wats.) Britton.
355, 541. *Lespedeza Nuttallii*, Darl.
126, 392, 494. *Lespedeza procumbens*, Michx.
135. *Lespedeza repens* (L.) Bart.
354, 489, 542. *Lespedeza Virginica* (L.) Britton.
465, 529, 538. MEIBOMIA ANGUSTIFOLIA (Torr. & Gray.) [*Desmodium paniculatum angustifolium*, Torr. & Gray.]
83, 242. *Meibomia grandiflora* (Walt.) Kuntze.
261, 406, 458, 576. *Meibomia lævigata* (Nutt.) Kuntze.
260, 402, 491. *Meibomia Marylandica* (L.) Kuntze.
80. *Meibomia nudiflora* (L.) Kuntze.
457. *Meibomia viridiflora* (L.) Kuntze.
11, 280, 470. *Oxalis recurva*, Ell.
51, 464. *Linum striatum*, Walt.
99, 303, 352, 568. *Linum Virginianum*, L.
164, 265. *Polygala Curtissii*, A. Gray.
139, 177, 421. *Acalypha gracilens*, A. Gray.
275, 327, 445. *Acalypha Virginica*, L.
146. *Euphorbia corollata*, L.
199. *Euphorbia maculata*, L.

523. *Phyllanthus Carolinensis*, Walt.
143. *Rhus copallina*, L.
509. *Ilex opaca*, Ait.
239. *Euonymus Americanus*, L.
240. *Acer*, sp.
223. *Impatiens aurea*, Muhl.
8. *Impatiens biflora*, Walt.
409. *Rhamnus Carolinianus*, Walt.
274, 333, 592. *Ampelopsis quinquefolia* (L.) Michx.
562. *Vitis æstivalis*, Michx.
322, 548. *Stuartia pentagyna*, L'Hér.
136. *Ascyrum hypericoides*, L.
397. *Hypericum Drummondii* (Grev. & Hook.) Torr. & Gray.
256. *Hypericum gentianoides* (L.) B. S. P.
9, 433. *Hypericum maculatum*, Walt.
12, 16. *Hypericum mutilum*, L.
75. *Hypericum prolificum*, L.
220. *Helianthemum majus* (L.) B. S. P.
495, 565. *Lechea minor*, L. [*L. thymifolia*, Michx.]
122, 230, 320. *Lechea racemulosa*, Michx.
246, 345. *Solea concolor* (Forst.) Ging.
13, 102. *Viola villosa*, Walt.
271. *Cuphea petiolata* (L.) Koehne.
66. *Rotala ramosior* (L.) Koehne.
212. *Circæa Lutetiana*, L.
94, 519. *Epilobium coloratum*, Muhl.
15. *Jussiæa decurrens* (Walt.), D. C.
59. *Ludwigia alternifolia*, L.
31. *Ludwigia palustris* (L.) Ell.
116, 148. *Aralia racemosa*, L.
349, 414, 482. *Aralia spinosa*, L.
207. *Panax quinquefolia*, L.
186. *Cicuta maculata*, L.
499. *Oxypolis rigida* (L.) Raf.
287. *Sanicula Canadensis*, L.
95, 241, 423, 547. *Thaspium atropurpureum* (Desr.) Nutt.
118, 293, 596. *Thaspium barbinode* (Michx.) Nutt.
302, 490. *Cornus florida*, L.
17, 546. *Clethra acuminata*, Michx.
89. *Azalea lutea*, L.
206. *Azalea nudiflora*, L.
107. *Gaultieria procumbens*, L.
182. *Kalmia latifolia*, L.
144. *Oxydendrum arboreum* (L.) D. C.
311. *Rhododendron maximum*, L.
417. *Andromeda ligustrina* (L.) Muhl.
550. *Gaylussacia ursina* (M. A. Curtis) Torr. and Gray.

82. *Vaccinum corymbosum*, L.
86, 291. *Vaccinium stamineum*, L.
106, 454, 467. *Galax aphylla*, L.
189. *Lysimachia quadrifolia*, L.
121. *Steironema* sp.
473. *Diospyros Virginiana*, L.
98, 514. *Asclepias obtusifolia*, Michx.
472, 588. *Cuscuta Gronovii*, Willd.
530. *Phlox maculata*, L.
424. *Prunella vulgaris*, L.
455, 545. *Collinsonia Canadensis*, L,
304, 401. *Cunila Mariana*, L.
64. *Hedeoma pulegioides* (L.) Pers.
157. *Isanthus brachiatus* (L.) B. S. P.
63. *Koellia incana* (Michx.) Kuntze.
228. *Lycopus Virginicus*, L.
92. *Melissa officinalis*, L.
162, 399. *Monarda clinopodia*, L.
469. *Scutellaria lateriflora*, L.
391. *Scutellaria saxatilis*, Riddell.
194. *Stachys cordata*, Riddell.
270. *Trichostema dichotomum*, L.
362, 476, 536, 557. *Chelone glabra*, L.
145. *Dasystoma pedicularia* (L.) Benth.
91. DASYSTOMA LÆVIGATA (Raf.) Britton. [*Gerardia lævigata*, Raf.]
200. *Ilysanthes gratioloides* (L.) Benth.
183, 225. *Mimulus ringens*, L.
273, 501. *Scrophularia Marylandica*, L.
334, 474. *Epiphegus Virginiana* (L.) Bart.
508, 559. *Cephalanthus occidentalis*, L.
68. *Diodia teres*, Walt.
277. *Galium circæzans*, Michx.
159. *Galium latifolium*, Michx.
233. *Galium pilosum*, Ait.
4, 450. *Galium tinctorium*, L.
30, 213, 232, 537. *Galium triflorum*, Michx.
528. *Houstonia purpurea*, L.
396. *Houstonia tenella*, Pursh.?
40, 77, 388. *Houstonia tenuifolia*, Nutt.
103. *Mitchella repens*, L.
88, 437. *Viburnum acerifolium*, L.
325. *Viburnum Lentago*, L.
45, 169, 227, 344. *Campanula Americana*, L.
124, 581. *Campanula divaricata*, Michx.
224, 468. *Lobelia cardinalis*, L.
79, 254. *Lobelia inflata*, L.

353, 413, 484. *Lobelia puberula*, Michx.
292, 431, 462. *Lobelia syphilitica*, L.
446. *Aster azureus*, Lindl.
161, 390, 535, 570. *Aster divaricatus*, L.
522, 551. *Aster dumosus*, L.
262, 412, 459. *Aster infirmus*, Michx.
356, 526, 549, 569. *Aster lateriflorus* (L.) Britton.
90a. *Aster leiophyllus lanceolatus*, Porter.
350, 451. *Aster patens*, Ait.
435, 525. *Aster prenanthoides*, Muhl.
252, 268, 564. *Aster surculosus*, Michx.
90, 259. *Aster undulatus*, L.
475. *Bidens lævis* (L.) B. S. P.
346, 403, 453. BRACHYCHÆTA SPHACELATA (Raf.) Britton. [*Brachychæta cordata* (Short) Torr. & Gray.]
296, 415. *Cacalia atriplicifolia*, L.
405. *Chrysopsis graminifolia*, Nutt.
266, 427, 540. *Chrysopsis Mariana* (L.) Nutt.
553. *Coreopsis tripteris*, L.
185. *Elephantopus Carolinianus*, Willd.
394, 438. *Elephantopus tomentosus*, L.
191, 393, 432, 502. *Erechthites hieracifolia* (L.) Raf.
218. *Erigeron Canadensis*, L.
331, 520. *Eupatorium ageratoides*, L. f.
486. *Eupatorium album*, L.
175. *Eupatorium pubescens*, Muhl.
166, 214, 398. *Eupatorium purpureum*, L.
416. *Eupatorium serotinum*, Michx.
285, 479. *Eupatorium sessilifolium*, L.
120, 404. *Eupatorium verbenæfolium*, Michx.[*E. teucriifolium*, Willd.]
219. *Gnaphalium Helleri*, Britt.
359, 506, 561. *Helenium autumnale*, L.
179. *Helianthus decapetalus*, L.
96, 171, 180, 217. *Helianthus parviflorus*, Bernh.
192. *Heliopsis helianthoides* (L.) B. S. P.
101, 231. *Hieracium Gronovii*, L.
167, 255, 418. *Hieracium paniculatum*, L.
360, 477, 503, 586. *Lactuca spicata* (Lam.) A. S. Hitchcock.
272. *Pluchea fœtida* (L.) D. C.
339, 460, 556, 589. *Prenanthes altissima*, L.
440. *Prenanthes Serpentaria*, Pursh.
324. *Rudbeckia laciniata*, L.
518. *Rudbeckia spathulata*, Michx.
480. *Sericocarpus asteroides* (L.) B. S. P.
407, 500, 511, 577. *Solidago arguta*, Ait.
585. *Solidago arguta*, Ait. (?)
543. *Solidago bicolor*, L.

357, 504. *Solidago Canadensis*, L.
358, 505, 524, 544. *Solidago Curtisii*, Torr. and Gray.
170, 238, 422, 563. *Solidago erecta*, Pursh.
517. *Solidago flexicaulis*, L.
420. *Solidago nemoralis*, Ait.
109. *Solidago odora*, Ait.
498. *Solidago patula*, Muhl.
531. *Solidago rugosa*, Mill.
269, 583. *Verebesina alternifolia* (L.) Britton. [*Actinomeris squarrosa*, Nutt.]
483. *Verbesina occidentalis* (L.) Walt.
188. *Vernonia gigantea* (Walt.) Britton. [*Vernonia altissima*, Nutt.]

The Solandi Process of Sun Printing.*

The above title might suggest that the following article should appear, if anywhere, in some journal upon physics, or at least not in one devoted strictly to botany. However, its purpose is only to treat a subject in its relation to the study of plant life, and therefore is offered only as a contribution to botanical technique.

The process consists, briefly, in exposing the subject, necessarily somewhat translucent, to the sunlight in a printing frame in common use by photographers, with a sheet of sensitized paper back of the subject, in the same manner as a print is taken from a negative of the ordinary sort. The paper which has thus far proved the most successful has been the "American Aristotype," for the manner of using which full directions accompany the same, and will not be entered into here.

The sun print thus obtained after it has been toned becomes the negative from which the positive picture is printed. To do this quickly and to the best advantage, the negative print is placed back downward in a dish containing a thin layer of common kerosene, care being taken to wipe it free from all surface oil after being removed. This negative saturated with the kerosene is placed face inward upon a clean plate of glass in the printing

* The substance of this paper, with many illustrative prints, was presented before Section G., A. A. A. S., Madison, August, 1893.

frame and upon it a fresh sheet of the "Aristo" paper is laid and clamped in place. The printing of the positive in the full sunlight is the work of only a half minute or so, but better results are often obtained by a slower printing in diffused light; in fact the same rules hold good for this form of printing as for that of ordinary negatives taken by means of the camera.

The process of toning is the same for the positive as the negative, and in the same bath an indefinite number of either or both may be undergoing the process at the same time.

The fact that the object needs to be partially translucent places limitations upon the application of the process, as likewise does the inability to enlarge or reduce the size of the object. There are, however, very many instances when the process may be employed with a considerable degree of satisfaction, and in some cases it is possible to bring out points of structure not recorded by the ordinary methods of photography. The principle is different, for in the one reflected light is ordinarily employed and a surface picture only is obtained; but by the Solandi (Sol and I) process the picture is obtained by the unequal transmission of light through the different parts of the object. For example a leaf variegation may be confined to the surface cells and is easily caught by photography, but not in the sun print. On the other hand the variegation may be more than skin deep and the results may be reversed by the two methods. Any object that is naturally thin enough to permit the passage of light, even feebly, may become a subject for sun printing, the time of exposure being correspondingly increased. Thick leaves like the orange, through which but little light seems to pass will give good prints after an exposure of a few hours, while ordinary leaves, as those of the maple, are quickly done. The orange leaf is a case in point where the sun print reveals in a striking manner the number, size, position, etc., of the oil glands, all of which are not secured in the common photograph. Anything like the venation of leaves is of course secured with full details by the process of transmitted light. In like manner many good records can be made of the various rusts, leaf spots and blights upon foliage, and excellent pictures of wood are secured when thin sections in any direction of the grain are employed.

In the case of leaves the negative may be secured from the freshly gathered specimens without any preparation; but dry objects from the herbarium work fully as well and often better when they are first saturated with the kerosene, in the same way as for the negative sun-prints and wiped free of excess of oil before being placed in the frame.

It was my hope to show to the readers of the BULLETIN actual specimens of the work done by the Solandi process, but it may be even better to present two engravings, as they will indicate that the sun prints may be used for illustrations in printed articles with a fair degree of success. Figure 1 shows a leaf of the com-

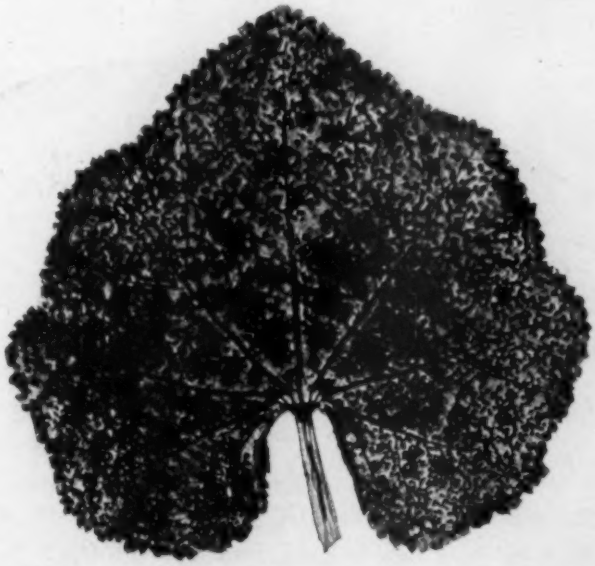

FIG. 1.—HOLLYHOCK LEAF WITH RUST (*Puccinia malvacearum*, Mont.).

mon hollyhock badly infested with the rust (*Puccinia malvacearum*, Mont.); this object being chosen as one that is a fair average as pathological specimens go, there being no marked light and dark patches as seen from a surface view. The transmitted light brings out the sori of the *Puccinia* in sufficient prominence to make them fairly distinct and much better than could have been done by ordinary photography. The second is another leaf (*Polygonatum*),

but of a widely different class from the mallow, in which the veining is prominent and the work of a leaf miner is illustrated, as also the presence of a blight (*Phyllostica cruenta*, Fr.) following in the wake of the ruin caused by the insect and producing its fruiting pycnidia.

By this process there is no opportunity for any minifying or magnifying of the object, and each detail is as exact as to size, location, etc., as possible. But the strongest points in favor of the process, aside from the merits of the results, are the ease with which the picture may be taken by any one, and the remarkable cheapness, for no camera or dark room is needed, and the whole time for the first exposure of the object until the positive is fin-

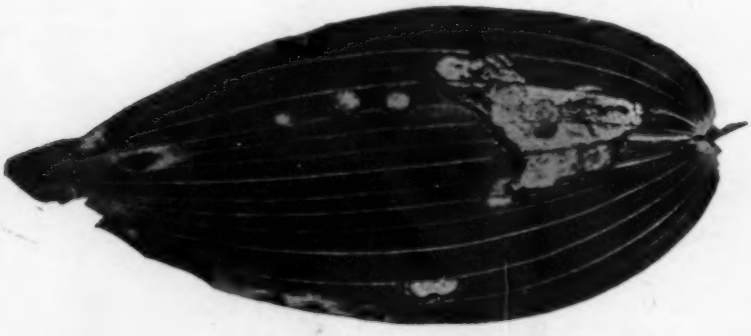

FIG. 2.—LEAF OF *Polygonatum biflorum* with Leaf-Miner, followed by *Phyllosticta cruenta*, FR.

ished may not be more than three hours.

There is nothing new in sun-printing, for Professor Kellerman and other American botanists have employed it. The chief point to be urged is the use of the clarifying agent, kerosene, for subjects when they are dry and for negative prints. This not only diminishes the time of exposure ten fold and more, but remarkably sharpens the details of the positive picture.

BYRON D. HALSTED.

RUTGERS COLLEGE, November 13, 1893.

The Index to recent Literature relating to American Botany.

Following out a recommendation of the Committee on Bibliography and Typography of the Madison Botanical Congress,* the form of our monthly record of American Botanical Literature will be changed in the next volume, so that the citations will be by authors instead of by subjects. It will be set in smaller type than the rest of the BULLETIN, and the titles will be printed off on library cards if a sufficient number of subscribers to these cards is obtained to justify their production. The proposed style of these cards is as here illustrated:

Lagerheim, G. von. Ueber das Vorkommen von Europæischen Uredineen auf der Hochebene von Quito. Bot. Centralb. **54**: 324–331. 1893.

Puccinia coronata and *P. graminis* are recorded as occurring in Ecuador, and *Fusarium uredinis* is described as new.

Matthew, W. D. A Study of the Scale-characters of the Northeastern American Species of *Cuscuta*. Bull. Torr. Bot. Club, **20**: 310–314. *pl. 164, 165*. 10 Aug. 1893.

Description and illustration of the corolla-scales, calyx and ovary of twelve species.

All correspondence concerning these cards should be addressed to

THE CAMBRIDGE BOTANICAL SUPPLY CO.,
CAMBRIDGE, MASS.

It is hoped that the record of papers may be made even more complete than hitherto, and if omissions are noted, it is earnestly requested that the attention of the editors may be called to them. The various journals and serial publications have been divided up among the editors, and Prof. Lucien M. Underwood, Prof. Conway Macmillan, Mr. F. V. Coville and Dr. S. Ely Jelliffe, who have kindly consented to coöperate in the work.

Botanical Notes.

Heliotropism of the Common Mallow.—While in California some years ago my attention was drawn to the common mallow

* See *Botanical Gazette*, xvii. 355, and BULLETIN, xx. 371.

of the Pacific coast (*Malva borealis*) on account of the very marked degree with which it exemplified the turning of leaves toward the sun. At the time a note was made upon the observations for all times of day and night in one of the botanical journals.

The common mallow of the Eastern, Middle and Western States (*Malva rotundifolia*) is no exception, and when growing in rich soil free from all other vegetation the heliotropism is striking enough. While at the Madison meeting of the A. A. A. S., the writer called, in private, the attention of several botanists to the phenomenon, and as it proved to be new to them, the following note is ventured, feeling quite sure that it will call out response from others who have long observed the same thing.

In the morning the blades of the leaves, if the day is clear, will be placed with their upper surface at right angles to the rays of the sun, and, by slowly turning, this position is maintained throughout the day.

Prof. Tracy informs me that the heliotropism of the cotton plant is well known even among the growers of the crops, and this leads one to wonder if the members of the Malvaceæ may not be quite generally influenced in the same way. It would be interesting to learn of the observations in this direction that have been made upon our native plants of the mallow family.

BYRON D. HALSTED.

RUTGERS COLLEGE, October 13, 1893.

Note on Scabiosa australis.—It may be of interest to note that on the 24th of last September I visited the station for *Scabiosa australis* mentioned in the January, 1893, BULLETIN, and found the plant abundant. It is evidently spreading southward. Specimens were noticed in the village of Whitney's Point, two miles south of the original locality. WILLARD N. CLUTE.

BINGHAMTON, N. Y., October 29, 1893.

Proceedings of the Club.

WEDNESDAY EVENING, NOVEMBER 29TH, 1893.

Dr. J. Bernard Brinton in the chair and sixteen persons present.

The following papers were read:

"On the Genus *Amelanchier*, Medic.," by Dr. N. L. Britton, illustrated by specimens.

"The Geographical Distribution of the Plants of Pennsylvania," by Prof. Thos. C. Porter.

Dr. Britton exhibited a copy of Trew's "Plantæ Selectæ," recently acquired by the botanical library of Columbia College.

Index to Recent Literature relating to American Botany.

Aberrant Forms in Cultivated Diatoms. Samuel Lockwood (Am. Mo. Mic. Journ. xiv. 269–273).

From "Le Diatomiste," June, 1893.

Acer rubrum, var. *Drummondii.* L. Spath (Gartenfl. xli. 357, with colored illustration).

Additions to the Flora of Colorado—Fungi. T. D. A. Cockerell (Zoë, iv. 282).

Aechmea Barleei. H. Witte (Gartenfl. xli. 359, with illustration).

Agave Americana. N. H. George and L. Wittmack (Gartenfl. xli. 269, with figures).

Ampelopsis quinquefolia—A Variety of. E. B. Knerr (Trans. Kansas Acad. Sci. xiii. 69).

Annual Report of the State Botanist of the State of New York. Charles H. Peck (45th Rep. N. Y. State Mus. Nat. Hist., Albany, 1893; reprint).

A list of plants not heretofore recorded from the State is given, fifteen or more species of Fungi are described as new, a study of the New York species of the genus *Omphalia* and other notes.

Asplenieas—Observaciones sobre alcunos Helechos Mexicanos de la Tribu de las. José N. Rovirosa (Naturaleza (Ser. ii.) ii. 179).

With illustrations of species of *Asplenium*, *Darea*, *Cænopteris*, *Athyrium*, *Diplazium*, *Hemidictyum* and *Anisogonium*.

Bacterial Flora of the Atlantic Ocean in the Vicinity of Wood's Holl Mass. H. L. Russell (Bot. Gaz. xviii. 383–395, 411–419; one plate).

Baptisia leucophæa. (Meehan's Month. iii. 177, with colored plate.)

Biographical Skizzen—I. Friedrich Sellow. Ign. Urban (Engler's Bot. Jahrb. xvii. 177–198).

Biographical sketch of this South American botanical collector, whose specimens have added so much to our knowledge of the flora of Brazil and Uruguay.

Bocconia arborea—Estudios relativos a la. Manuel M. Villada (Naturaleza (Ser. ii.) ii. 207).

Botanical Aspect of Pike's Peak—The. V. Havard (Gard. and For. vi. 452).

Botanical Notes from Texas. E. N. Plank (Gard. and For. vi. 272; 513).

Botanical Notes. Alice Eastwood (Zoë, iv. 186).

Botany of Martha's Vineyard—Observations on the Geology and. Arthur Hollick (Trans. N. Y. Acad. Sci. xiii. 8; reprint).

Brasilianischen Nutz-und Heilpflanzen—Die. Theodor Peckholt (Pharm. Rundsch. xi. 287).

Brassavola glauca. Alexander Bode (Gartenfl. xli. 176, with figure).

Calceolaria andina. J. D. Hooker (Curtis Bot. Mag. xlix. t. 7326). Describes a new species from Chili.

Californian Flora—Southern Extension of. T. S. Brandegee (Zoë, iv. 199).

Californian Uredineæ—New. P. Dietel (Erythea, i. 247–252). Descriptions of new species in *Uredo*, *Uromyces* and *Puccinia*.

Cane Diseases and Pests in Trinidad. J. H. Hart (Bull. Misc. Infor. Trinidad, Roy. Bot. Gard., June, 1893).

Carduus heterolepis. J. N. Rose (Erythea, i. 234).

Catalogue of the North American Phenogams and Vascular Cryptogams in the Blake Herbarium. F. L. Harvey and F. P. Briggs (Bull. Maine State Coll. Lab. i. No. 2).

Composite Flora of Kansas—The Relations of the. A. S. Hitchcock (Trans. Kansas Acad. Sci. xiii. 89).

Contributions to Western Botany. Marcus E. Jones (Zoë, iv. 254).

Includes a Revision of the American species of Aquilegia north of Mexico, notes on *Townsendia*, and descriptions of new species or varieties in *Thelypodium*, *Caulanthus*, *Lepidium*, *Astragalus*, *Potentilla*, *Frasera*, *Emmenanthe*, *Phacelia*, *Gilia*, *Pentstemon* and *Eriogonum*.

Corrections in Nomenclature—III. Edw. L. Greene (Erythea, i. 206–208).

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Delphinum—Neue Arten der Gattung. E. Huth (Bull. Herb. Boiss. i. 327–336; Pl. 14–17).

D. Penardi and *D. Barbeyi*, from Colorado, and *D. Ehrenbergii*, from Mexico are characterized.

Diatomaceæ of Minnesota. Inter-Glacial Peat. Benjamin W. Thomas (20th Ann. Rep. Geol. and Nat. Hist. Survey of Minnesota; pp. 291–320).

Diatomaceæ—What is a species in the? Arthur M. Edwards (Am. Month. Micr. Journ. xiii. 212).

Dipladenia atropurpurea. (Garden, xliv. 488, with colored illustrations.)

Erythronium mesochoreum. E. B. Knerr: Trans. Kansas Acad. Sci. xiii. 20).

With illustrations of species of *Asplenium*, *Darea*, *Cænopteris*, *Athyrium*, *Diplazium*, *Hemidictyum* and *Anisogonium*.

Bacterial Flora of the Atlantic Ocean in the Vicinity of Wood's Holl Mass. H. L. Russell (Bot. Gaz. xviii. 383–395, 411–419; one plate).

Baptisia leucophæa. (Meehan's Month. iii. 177, with colored plate.)

Biographical Skizzen—I. Friedrich Sellow. Ign. Urban (Engler's Bot. Jahrb. xvii. 177–198).

Biographical sketch of this South American botanical collector, whose specimens have added so much to our knowledge of the flora of Brazil and Uruguay.

Bocconia arborea—Estudios relativos a la. Manuel M. Villada (Naturaleza (Ser. ii.) ii. 207).

Botanical Aspect of Pike's Peak—The. V. Havard (Gard. and For. vi. 452).

Botanical Notes from Texas. E. N. Plank (Gard. and For. vi. 272; 513).

Botanical Notes. Alice Eastwood (Zoë, iv. 186).

Botany of Martha's Vineyard—Observations on the Geology and. Arthur Hollick (Trans. N. Y. Acad. Sci. xiii. 8; reprint).

Brasilianischen Nutz-und Heilpflanzen—Die. Theodor Peckholt (Pharm. Rundsch. xi. 287).

Brassavola glauca. Alexander Bode (Gartenfl. xli. 176, with figure).

Calceolaria andina. J. D. Hooker (Curtis Bot. Mag. xlix. t. 7326). Describes a new species from Chili.

Californian Flora—Southern Extension of. T. S. Brandegee (Zoë, iv. 199).

Californian Uredineæ—New. P. Dietel (Erythea, i. 247–252). Descriptions of new species in *Uredo*, *Uromyces* and *Puccinia*.

Cane Diseases and Pests in Trinidad. J. H. Hart (Bull. Misc. Infor. Trinidad, Roy. Bot. Gard., June, 1893).

Carduus heterolepis. J. N. Rose (Erythea, i. 234).

Catalogue of the North American Phenogams and Vascular Cryptogams in the Blake Herbarium. F. L. Harvey and F. P. Briggs (Bull. Maine State Coll. Lab. i. No. 2).

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Erythronium mesochoreum. E. B. Knerr; Trans. Kansas Acad. Sci. xiii. 20).

Flora of Bouldin Island. Katharine Brandegee (Zoe, iv. 211).

Flora of Greenland—A Contribution to the. W. E. Meehan (Proc. Acad. Sci. Phila., April, 1893, 205).

Flora of Kansas—Additions to the. B. B. Smyth (Trans. Kansas Acad. Sci. xiii. 96).

Flora of Staten Island—Additions to the. W. T. Davis (Proc. Nat. Sci. Assoc. Staten Island, Oct. 14, 1893).

Flowering Plants and Ferns Collected in Franklin County, Kansas—A List of. W. E. Castle (Trans. Kansas Acad. Sci. xiii. 80.)

Fungi—New West American. J. B. Ellis and B. M. Everhart (Erythea. i. 197–206).

Descriptions of twenty-nine species in various genera.

Fungus from the Coal Measures.—A New. H. Herzer (Am. Geol. xii. 289, 290, Pl. xiii.).

A description of the new genus and species, *Dactyloporus archæus*, from the carboniferous formation in Tuscarawas county, Ohio. It is stated to be generically allied to *Polyporus* as to its sporiferous tubes, and again to *Agaricus* by its pileus and trunk. A wretchedly poor plate, similar in execution to others which have recently appeared in the same publication, accompanies the description.

Georgia (Tetraphis) pellucida et les Espèeces alliées. N. C. Kindberg (Rev. Bryol. xx. 92, 1893).

Four North American species are briefly described, of which two bear new names. *Georgia cuspidata* is said to be different from *G. pellucida* in the curved capsules and excurrent vein of the perichætial leaves. The specimens were collected in Canada by Macoun, and near Columbus, Ohio, by Schrader. We have seen Prof. Macoun's specimens and do not think them worthy of specific rank as the capsules are often curved and the pedicels very variable in length in *G. pellucida;* on the same plant the vein may disappear below the apex in the lower bracts, and be excurrent in the upper.

G. trachypoda is said to differ from *G. geniculata* in the seta being rough above, not below and not geniculate. It will be remembered that Braithwaite cites a variety *curvata*, Lindb., founded

on North American specimens of *G. pellucida*, with curved capsules, and that the pedicel of *G. geniculata* is described as rough above the bend, not below. E. G. B.

Gilia superba. Phacelia nudicaulis. Alice Eastwood (Zoë, iv. 296).

The author reduces the two above species to *Gilia subnuda*, Torr., and *Phacelia demissa*, A. Gray.

Gossypium lancæforme, Miers. James Britten (Journ. Bot. xxxi. 330–331).

Description of a new species from Mexico.

Grasses from Mexico—Descriptions of new. George Vasey (Contr. U. S. Nat. Herb. i. 281).

New species of *Paspalum*, *Panicum*, *Aristida*, *Muhlenbergia*, *Sporobolus* and *Eragrostis* are described.

Grasses from the United States—Descriptions of new or noteworthy. George Vasey (Contr. U. S. Nat. Herb. i. 267).

Descriptions of new species of *Stipa*, *Orysopsis*, *Muhlenbergia*, *Sporobolus*, *Bouteloua*, *Sieglingia*, *Eragrostis*, *Melica*, *Poa*, *Festuca*, and *Elymus*.

Grasses—Notes on some Pacific Coast. George Vasey (Contr. U. S. Nat. Herb. i. 265.

Guide to the Study of the Common Plants. Volney M. Spalding (12 mo. pp. xxiii. 246. Boston, Heath & Co., 1893).

Halesia v. *Mohria.* W. Watson (Gard. and For. vi. 486).

Halesia vs. Mohria vel Mohrodendron. J. H. Redfield, N. L. Britton (Gard. and For. vi. 518).

Heuchera sanguinea. (Gartenfl. xli. 617, with colored plate.)

Indefinite Stamens and subsessile Pods in Cleome. Edw. L. Greene (Erythea, i. 233–234).

Introduced Plants in the Arid Region. E. L. Berthould (Bot. Gaz. xviii. 435).

Laminariaceæ—On the Classification and Geographical Distribution of the. William Albert Setchell (Trans. Conn. Acad. ix. 333, reprint).

Leaf-Hair Structures—On certain. Walter C. Blasdale (Erythea, i. 252–257; one plate).

Liatris scariosa. N. E. Brown (Gardn. Chron. xiv. 593, with figure).

Lichens from California and Mexico, collected by Dr. Edward Palmer from 1888–1892—List of. J. W. Eckfeldt (Contr. U. S. Nat. Herb. i. 291).

Lobeliaceous Plants—Two rare. Edw. L. Greene (Erythea, i. 237. 238).

The genus *Baclea* is proposed for the *Nemacladus oppositifolius*, Robinson, and *Bolelia lata* described as new.

Maize—A Botanical and Economic Study. John W. Harshberger (Contr. Bot. Lab. Univ. Penn. i. No. 2, 75–202; three plates).

Masdevallia racemosa. F. C. Lehmann (Gartnfl. xli. 488, illustrated).

Michigan Plants—New and rare. G. H. Hicks (Asa Gray Bull. No. 3, 1893).

Novitates occidentales—V. Edward L. Greene (Erythea, i. 221–224).

New species and varieties are described in *Astragalus, Amelanchier, Saxifraga, Arabis, Senecio* and *Ptiloria.*

Novitates occidentales—VI. Edw. L. Greene (Erythea, i. 258–260).

Descriptions of new species in *Lotus, Helianthemum, Polygonum* and *Uropappus.*

New Plants—Descriptions of three. J. N. Rose (Contr. U. S. Nat. Herb. i. 289).

Ranunculus Cooleyæ and *Ligusticum Macounii* from Alaska, and *Sphæralcea Orcuttii* from the Colorado Desert, are the species described.

New Plants from Texas and Colorado—Descriptions of four. J. M. Holzinger (Contr. U. S. Nat. Herb. i. 288).

Descriptions of *Claytonia Bodini, Baptisia lanceolata*, var. *Texana, Stemodia Schottii*, and *Oxybaphus Bodini.*

Odontoglossum constrictum, Lindl., var. Sanderianum, Rbch. F. Krânzlin (Gartenfl. xli. 65).

Odontoglossum cirrhosum. L. Wittmack (Gartenfl. xli. 593, with colored plate).

Our Native Ferns and their Allies. L. M. Underwood (Fourth Edition, revised, 1893).

The author continues to improve this valuable little book, by bringing the list of publications under each chapter up to date, and incorporating the results of recent investigations and collection, as well as revising the nomenclature to conform to the Rochester Code. It supplies in a handy and inexpensive form much valuable information, and besides its high scientific value is an interesting and attractive addition to the library.

Papaveraceas—Los Alcaloides de las. Manuel M. Villada (Naturaleza (Ser. ii.) ii. 212).

Perityle rotundifolia (*Amauria*). T. S. Brandegee (Zoë, iv. 210).

Phanerogamic Parasites—On the Structure of the Haustoria of Some. George J. Pierce (Ann. Bot. vii. 291, with plates).

Phenogams and Vascular Cryptogams of Maine—A Contribution to the. F. L. Harvey and F. P. Briggs (Bull. Maine State College Lab. i. No 2).

Phyllospadix—The Genus. William Russell Dudley (Wilder Quarter-Century Book, Ithaca, N. Y., 1893, reprint).

A critical study of the genus, with illustrations of *P. Torreyi*

Piñon Gathering among the Parramint Indians. B. H. Dutcher (Am. Anthrop. Oct. 1893).

Describing the gathering of the nuts of *Pinus monophylla.*

Pitcairnia floccosa. L. Wittmack and C. E. Kirschoff (Gartenfl. xli. 352, with figures.)

Plantæ Glazioviane novæ minus cognitæ. P. Taubert (Bot. Jahrb. xvii. 502).

New species from Brazil are described in the genera *Saccoglottis, Oxalis, Poecilandra, Drosera, Turnera, Klotzschia, Didymopanax, Gaylussacia, Agarista, Buddleia, Coccoloba, Cryptocarya, Hufelandia, Acrodiclidium, Phœbe, Ocotea, Pellæa, Anemia,* and thirteen species of fungi. A new genus in the Gentianaceæ, with one species, *Senæa cærulea,* is also described.

Plants Collected by the Garfield University Expedition of 1889—List of. M. A. Carleton (Trans. Kansas Acad. Sci. xii. 50).

Plant Intelligence. Walter C. Kerr (Proc. Nat. Sci. Assoc. Staten Island, Oct. 14, 1893).

Description of the movements exhibited by the flowering scape of *Eichornia crassipes.*

Plants of Mason County, Mich. H. T. Blodgett (Asa Gray Bull. No. 3, 1893).

Plants New to Florida—List of. J. M. Holzinger (Contr. U. S. Nat. Herb. i. 288).

Popular American Plant Names—II. Fanny D. Bergen (Bot. Gaz. xviii. 411).

Preliminary Report of the Microscopical Organisms of the Brooklyn Water Supply. Smith Ely Jelliffe (Brooklyn Medical Journal, vii. 593–617).

A report is made upon the organisms found during the six months from November, 1892, to May, 1893, and details of the method of examination, a short resumé of the work done in similar lines, the seasonal distribution and the sanitary relationships are discussed. A series of plates giving the comparative abundance of the organisms is given; a partial bibliography of the American titles on the microscopical examinations of water supplies. Three plates, representing most of the organisms that appear in the lists, close the contribution.

Quercus Prinos (Gardn. Chron. xiv. 61, with figure).

Report of the Botanist. L. R. Jones (Report Vermont State Agric. Exp. Sta. for 1892, illustrated).

Report on "Cacao" in Nicaragua. (Bull. Roy. Bot. Gard. Trinidad, Sept., 1893.)

Report upon the Hills of Louisiana, south of the U. S. and P. R. R., to Alexandria, La.—A preliminary. Part II. Otto Lerch (pamph. pp. 159, Baton Rouge, 1893).

This is a characteristic elementary document, designed for popular use. There are some facts in regard to the distribution of plants which are of interest, and these may be found under 'Botanical Notes' on pages 151–158. Thus the trees and shrubs are grouped according to the character of the soil in which they grow, which is always a matter of interest. A list of twenty her-

baceous plants is also included, under the heading 'Medicinal Herbs,' and finally there is what purports to be a list of "Grasses." In this latter may be noted species of *Carex*, *Scirpus*, *Cyperus*, *Juncus*, *Eleocharis*, *Rhyncospora*, *Lespedeza* (*!*) etc. A. H.

Rhipsalis Warmingiana. G. A. Lindberg (Gartenfl. xli. 8, with figures).

Riparian Botany of the Lower Sacramento. Willis L. Jepson (Erythea, i. 238–246).

Robinia Neo-Mexicana. L. Wittmark and F. Brettschneider (Gartenfl. xli. 649, with colored plate).

Rodriguezia Calopectron. E. Regel (Gartenfl. xli. 281, with colored plate).

Rubber of the Orinoco—The. A. Ernst (Bull. Misc. Infor. Trinidad, Roy. Bot. Gard., June, 1893).

Describing *Hevea Brasiliensis* and the methods by which the rubber is collected.

Rust of Mountain Ash—The. Byron D. Halsted (Gard. and For. vi. 508).

Note on *Gymnosporangium globosum.*

Salvinia natans on Staten Island. W. C. Kerr (Proc. Nat. Sci. Assoc. Staten Island, October 14, 1893).

Record of its recent introduction.

Sap of Trees and its Movements—The so-called. Charles R. Barnes (Science, xxi. 239–241).

An address delivered before the State Horticultural Society of Wisconsin.

Sectioning Fern Prothallia and other delicate Objects. W. B. Thomas (The Microscope (II.) i. 167–168).

Selective Absorption of Heat by Leaves. G. A. Meyer (Trans. Kansas Acad. Sci. xiii. 48).

Senecio sagittifolius. J. D. Hooker (Curtis Bot. Mag. xlix. t. 7322).

Describes a new species from Uruguay.

Serjania–Arten—Drei neue. L. Radlkofer (Bull. Herb. Boiss. i. 464–468).

S. alurigera from Peru, *S. lateritia* from Guatemala, and *S. didymadenia* from Bolivia (Rusby, 517, distributed as *S. clematidifolia*, Camb.?).

Skizze der Vegetationsverhaltnisse von Santiago in Chile. Fr. Meigen (Engler's Bot. Jahrb. xvii. 199–294).

A general account of the flora of the region, supplemented by a list of several hundred species collected by the author, novelties being described in the following genera: *Calceolaria*, *Draba*, *Gilia* *Œnothera*, *Pernettya*, *Senecio*, *Solanum* and *Valeriana*.

Sudamerikanische Hochgebirgspflanzen. W. Siber (Gartenfl. xli. 425, 452). With colored illustrations of *Paranephelius uniflorus*, *Espeletia grandiflora*, *Eryngium pumillum* and *Veronica cupressoides*.

Taxodium distichum. Maxwell T. Masters (Gardn. Chron. xiv. 659, with figure.)

Texas Trees—Notes on Some of the. J. Reverchon (Gard. and For. vi. 503).

Æsculus arguta, *Sapindus marginatus*, *Rhus copalina*, var. *lanceolata*, *Sophora affinis*, *Prosopis juliflora* and *Bumelia lanuginosa* are the species discussed.

Tillandsia Lorentziana Griseb. und andere Argentinische Arten—Bemerkungen zu. F. Kurtz (Gartenfl. xli. 404).

Uredineæ of the San Francisco Bay Region—The. W. C. Blasdale (Asa Gray Bull. No. 3, 1893).

Vagrant Crucifers. John Higgins (Asa Gray Bull. No. 3, 1893).

Variations in Dominant Species of Plants. W. A. Carleton (Trans. Kansas Acad. Sci. xiii. 24).

Victoria regia. H. Gaerdt (Gartenfl. xli. 651).

Vitis Baileyana, Munson. T. V. Munson (Leaflet, pp. 2, dated June 20, 1893, issued November, 1893).

Description of the grape first described by Mr. Munson as *V. Virginiana;* this name being a homonym of a Lamarckian species is here changed to the above.

Vitis in Kansas—The Distribution of the Genus. A. S. Hitchcock (Trans. Kansas Acad. Sci. xiii. 79).

Water Lily Trees—The. F. W. Burbidge (Garden, xliv. 438). With colored illustration of *Magnolia Fraseri.*

West American Coniferæ—Notes on—III. J. G. Lemmon (Erythea, i. 224–231).

Mr. Lemmon here discusses the synonymy and nomenclature of the Monterey Pine and the Knob-cone Pine, and concludes that the former should be known as *Pinus radiata,* Don, and the latter as *P. attenuata,* Lemmon.

Western Kansas—Some Notes on Condensed Vegetation in. Minnie Reed (Trans. Kansas Acad. Sci. xiii. 91).

Winter-Killing of Trees and Shrubs—The. Aven Nelson (Wyoming Exper. Sta. Bull. No. 15, 1893).

Contributions from the Herbarium of Columbia College.

No. 1. A Preliminary List of North American species of *Cyperus*, with Descriptions of New Forms. By N. L. Britton (1886), ... 25 cents.

No. 2. *Cerastium arvense*, L., and its North American Varieties. By Arthur Hollick and N. L. Britton (1887). (Out of print.)

No. 3. Plant Notes from Temiscouata County, Canada. By J. I. Northrop (1887). (Out of print.)

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No. 8. A Recent Discovery of Hybrid Oaks on Staten Island. By Arthur Hollick. (1888), ... 25 cents.

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